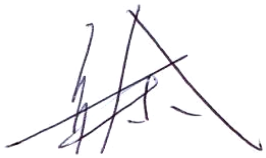
TEST REPORT

1. Applicant		
Name	:	Maytel Co., Ltd
Brand Name	:	N/A
Address	:	417 Doosan Venture Digm 126-1, Pyeongchon-dong, Dongan-gu, Anyang-si, 431-070, South Korea
FCC ID	:	YJH-MC-11
2. Products		
Name	:	Multicom
Model No.	:	MC-11
Variant Model No.	:	MC11-900, MC-11AL, MC-11UA, MC-11US, MC-11UM, MC-11UC
Manufacturer		Maytel Co., Ltd
Address		417 Doosan Venture Digm 126-1, Pyeongchon-dong, Dongan-gu, Anyang-si, 431-070, South Korea
3. Test Standard	:	47 CFR Part 15, Subpart C
4. Test Method	:	ANSI C63.10-2009
5. Test Result	:	PASS
6. Dates of Test	:	January 01, 2016 to January 08, 2016
7. Date of Issue	:	January 12, 2016
8. Test Laboratory	:	Standard Engineering Co. Ltd. FCC Designation Number : 624439

Tested by	Approved by
	
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1. Test Summary

Test	Test Requirement	Test method	Result
Antenna Requirement	FCC PART 15 C section 15.247 (c) and Section 15.203	FCC PART 15 C section 15.247 (c) and Section 15.203	PASS
Occupied Bandwidth	FCC PART 15 C section 15.247 (a)(1)(i)	ANSI C63.10: Clause 6.9.1	PASS
Carrier Frequencies Separated	FCC PART 15 C section 15.247(a)(1)	ANSI C63.10: Clause 7.7.2	PASS
Hopping Channel Number	FCC PART 15 C section 15.247(a)(1)(i)	ANSI C63.10: Clause 7.7.3	PASS
Dwell Time	FCC PART 15 C section 15.247(a)(1)(i)	ANSI C63.10: Clause 7.7.4	PASS
Pseudorandom frequency-hopping sequence	FCC PART 15 C section 15.247(a)(1)	ANSI C63.10: Clause 7.7.5	PASS
Maximum Peak Output Power	FCC PART 15 C section 15.247(b)(2)	ANSI C63.10: Clause 6.10.1	PASS
Conducted Spurious Emission	FCC PART 15 C section 15.247(d)	ANSI C63.10: Clause 6.7	PASS
Radiated Spurious Emission	FCC PART 15 C section 15.247 (d) &15.209	ANSI C63.10: Clause 6.4, 6.5 and 6.6	PASS
Conducted Emissions at Mains Terminals	FCC PART 15 C section 15.207	ANSI C63.10: Clause 6.2	PASS
Radio Frequency Exposure Procedures	FCC PART 15 C section 15.247 (i) & 1.1307(b) & 2.1091	-	PASS

Remark:

N/A: not applicable. Refer to the relative section for the details.

EUT: In this whole report EUT means Equipment Under Test.

Tx: In this whole report Tx (or tx) means Transmitter.

Rx: In this whole report Rx (or rx) means Receiver.

RF: In this whole report RF means Radio Frequency.

ANSI C63.10: the detail version is ANSI C63.10:2009 in the whole report.

DA 00-705 was used as a guideline in preparing this Test Report.

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3. General Information

3.1. Client Information

Applicant : Maytel Co., Ltd
Address of Applicant : 417 Doosan Venture Digm 126-1, Pyeongchon-dong, Dongan-gu, Anyang-si, 431-070, South Korea

3.2. General Description of E.U.T.

Product Name : Multicom
Model No. : MC-11

3.3. Details of E.U.T.

Operating Frequency	:	903 MHz to 926.5 MHz
Type of Modulation	:	FHSS
Number of Channels	:	48 Channels
Hopping Channels	:	25 Channels
Channel Separation	:	500 KHz
Antenna Type	:	Integral (Helical Antenna)
Antenna gain	:	0 dBi
Speciality	:	N/A
Power Supply	:	Input Voltage: 5.0V Output Voltage: DC 3.7V / 1100mA
Normal Test Voltage	:	DC 3.7V

Remark:

1. The lowest, middle, highest channel numbers of the Radio Module used and tested in this report are separately 0 (903MHz), 24 (915MHz), 47 (926.5MHz).
2. For a more detailed description, please refer to Specification or User's Manual supplied by the applicant and/or manufacturer.

3.4. Description of Support Units

The EUT has been tested with corresponding accessories as below:
Supplied by Standard Engineering Laboratory.:

Description	Manufacturer	Model No.	Serial No.
Power Supply	Provice	PWS-5005D	205050
-	-	-	-

3.5. Abnormalities from Standard Conditions

None.

3.6. Other Information Requested by the Customer

None.

3.7. Test Location

377-11, Sinjang-ri, Eumam-myeon, Seosan-si, ChoongNam 356-844, South Korea
Tel.: +82-41-663-9436,
Fax :+82-41-663-9434
Home page: www.stdeng.com
FCC Designation Number : 624439

This test site is in compliance with ISO/IEC 17025 for general requirements for the competence of testing and calibration laboratories.

4. Equipment Used during Test

No.	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Data	Used equipment
1	EMI Test Receiver	LIG	ER-265	L1009B016	03/04/2015	03/04/2016	■
2	EMI Test Receiver	Rhode & Schwarz	ESIB7	3311	02/11/2015	02/11/2016	■
2	Bi-log Antenna	Schwarzbeck	VULB9163	164	09/15/2014	09/15/2016	■
5	Loop Antenna	EMCO	6502	9206-2769	02/13/2014	02/13/2016	■
6	Spectrum Analyzer	Agilent	E4440A	US45303130	02/04/2015	02/04/2016	■
8	Frequency Counter	HP	5347A	3009A02742	02/04/2015	02/04/2016	■
13	Attenuator	Agilent	8495B	3308A22485	02/04/2015	02/04/2016	□
15	Power Meter	Agilent	E4418B	MY405111655	02/04/2015	02/04/2016	□
16	Power Sensor	HP	8485A	2347A02746	02/04/2015	02/04/2016	□
18	RF Cable	Gigalane	SMS102-MF141-SMS102-1.0M	PB1252301285	N/A	N/A	■
20	Signal Generator	HP	83630A	3420A00728	02/04/2015	02/04/2016	■
21	Oscilloscope	HP	54815A	US38380122	02/04/2015	02/04/2016	□
23	Pre Amplifier	Agilent	8449B	3008A02105	02/04/2015	02/04/2016	■
25	Signal Generator	Rhode & Schwarz	SML03	102330	01/23/2015	02/04/2016	■
26	POWER DIVIDER	Agilent	11636B	50309	02/04/2015	02/04/2016	□
27	Power Sensor	Agilent	8482B	3318A05111	02/04/2015	02/04/2016	□
29	DC Power Supply	HP	6032A	US35420383	02/04/2015	02/04/2016	□
30	Slidacs	Sunchang Electrics	5KV	N/A	02/04/2015	02/04/2016	□
32	Bandreject Filter	K&L Microwave	50140	555	02/04/2015	02/04/2016	□
33	Horn Antenna	SCHWARZBECK	BBHA9120A	346	01/27/2014	01/27/2016	■
34	Horn Antenna	A.H. SYSTEMS	SAS-572	269	08/07/2015	08/07/2017	■
35	DC Power Supply	Provice	PWS-5005D	205050	02/04/2015	02/04/2016	■
36	LISN	Rhode & Schwarz	ESH2-Z5	100164	01/27/2015	01/27/2016	■
38	Pulse Limiter	Rhode & Schwarz	ESH3-Z2	100137	11/13/2015	11/13/2016	■

5. Test Results

5.1. E.U.T. test conditions

Test Voltage:	DC 3.7V
Temperature:	20.0 -25.0 °C
Humidity:	38-50 % RH
Atmospheric Pressure:	1000 -1010 mbar
Test frequencies and frequency range:	According to the 15.31(m) Measurements on intentional radiators or receivers, other than TV broadcast receivers, shall be performed and, if required, reported for each band in which the device can be operated with the device operating at the number of frequencies in each band specified in the following table: According to the 15.33 (a) For an intentional radiator, the spectrum shall be investigated from the lowest radio frequency signal generated in the device, without going below 9 kHz, up to at least the frequency shown in the following table:

Number of fundamental frequencies to be tested in EUT transmit band

Frequency range in which device operates	Number of frequencies	Location in frequency range of operation
1 MHz or less	1	Middle
1 MHz to 10 MHz	2	1 near top and 1 near bottom
More than 10 MHz	3	1 near top, 1 near middle and 1 near bottom

Frequency range of radiated emission measurements

Lowest frequency generated in the device	Upper frequency range of measurement
9 kHz to below 10 GHz	10th harmonic of highest fundamental frequency or to 40 GHz, whichever is lower
At or above 10 GHz to below 30 GHz	5th harmonic of highest fundamental frequency or to 100 GHz, whichever is lower
At or above 30 GHz	5th harmonic of highest fundamental frequency or to 200 GHz, whichever is lower, unless otherwise specified

EUT channels and frequencies list:

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	903	20	913	40	923
1	903.5	21	913.5	41	923.5
2	904	22	914	42	924
3	904.5	23	914.5	43	924.5
4	905	24	915	44	925
5	905.5	25	915.5	45	925.5
6	906	26	916	46	926
7	906.5	27	916.5	47	926.5
8	907	28	917		
9	907.5	29	917.5		
10	908	30	918		
11	908.5	31	918.5		
12	909	32	919		
13	909.5	33	919.5		
14	910	34	920		
15	910.5	35	920.5		
16	911	36	921		
17	911.5	37	921.5		
18	912	38	922		
19	912.5	39	922.5		

Remark:

Test frequencies are the lowest channel: 0 channel(903 MHz), middle channel: 24 channel(915 MHz) and highest channel: 47 channel(926.5 MHz)

5.2. Antenna Requirement

Standard requirement

15.203 requirement::

According to FCC 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

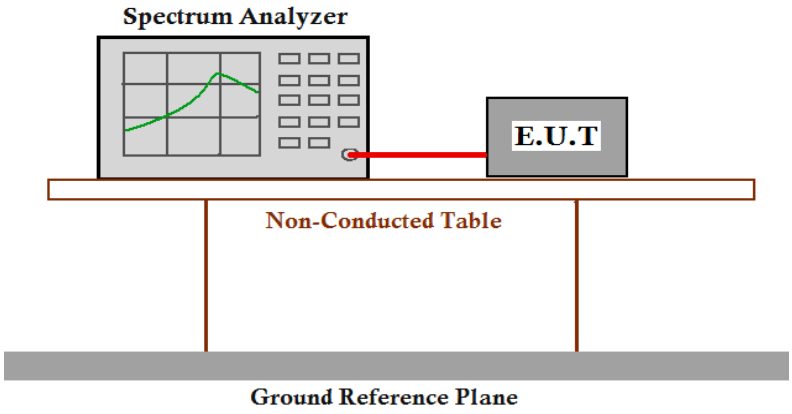
EUT Antenna **PASS**

The transmitter has an Integrated Helical antenna. The directional gain of the antenna is 0 dBi. please refer to the EUT internal photos.

5.3. Occupied Bandwidth

Test Requirement:	FCC Part 15 C section 15.247 (a)(1)(i) For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.
Test Method:	ANSI C63.10: Clause 6.9.1
Test Status:	Pre-test the EUT in continuous transmitting mode at the lowest (903 MHz), middle (915 MHz) and highest (926.5 MHz) channel

Test Configuration:



Test Procedure:

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;
2. Set the spectrum analyzer: Span = approximately 2 to 3 times the 20dB bandwidth, centered on a hopping channel;
3. Set the spectrum analyzer: RBW >= 1% of the 20dB bandwidth;
   VBW >= RBW; Sweep = auto; Detector Function = Peak; Trace = Max Hold;
4. Mark the peak frequency and -20 dB points bandwidth.

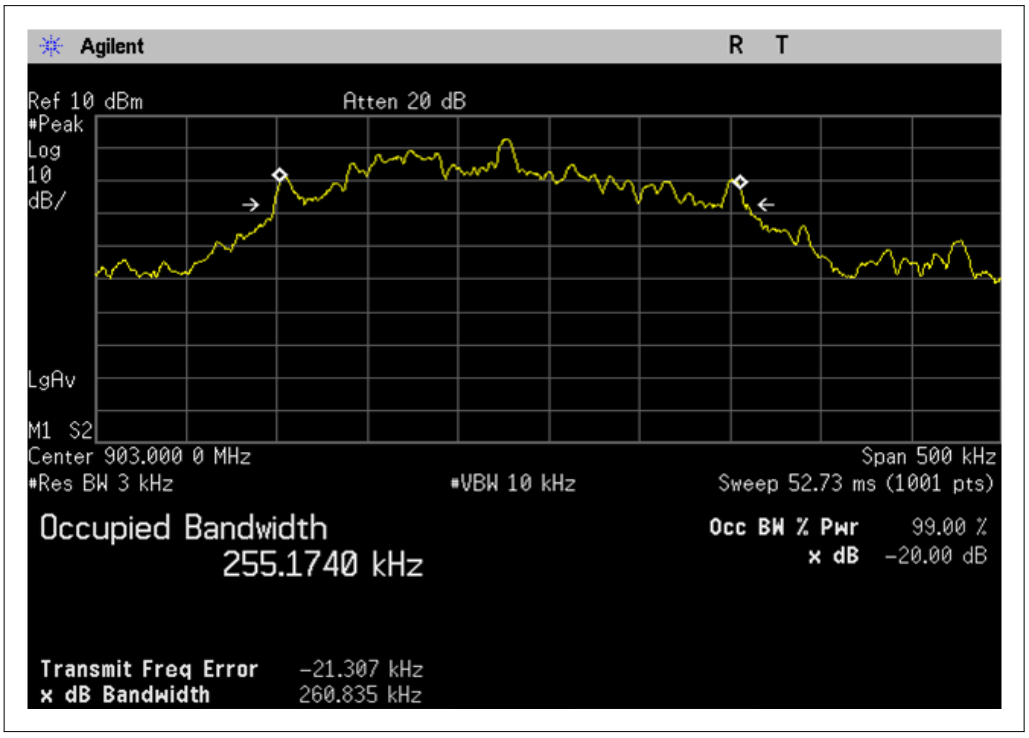
Test result:

Normal mode:

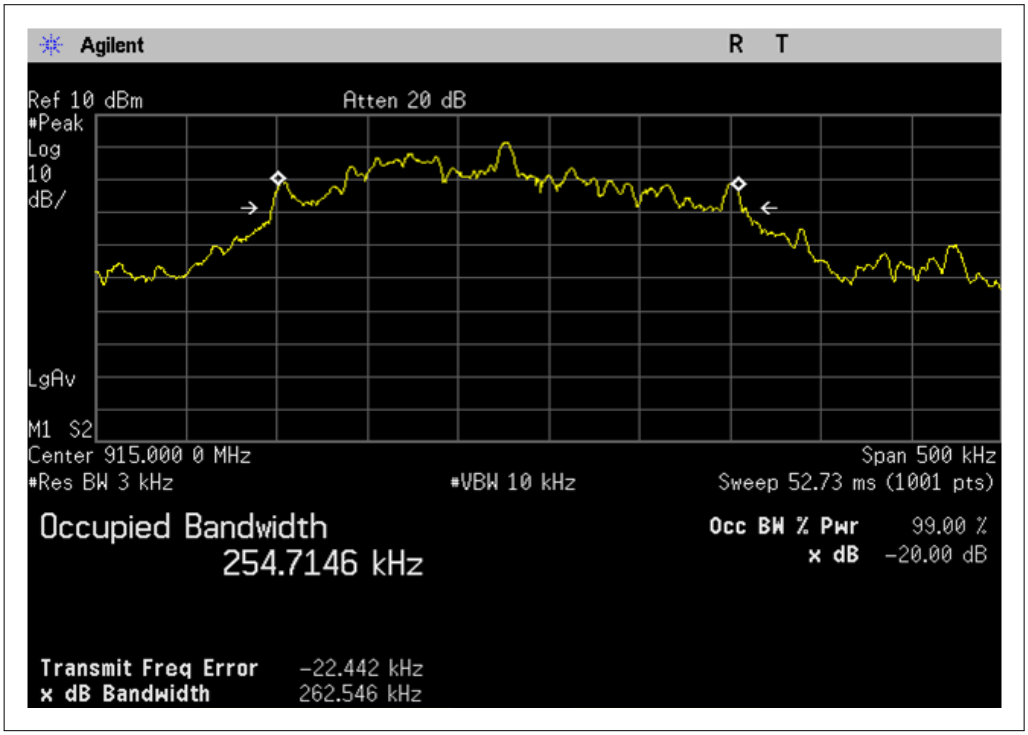
Test Channel	Frequency (MHz)	Bandwidth (kHz)
Lowest	903	260
Middle	915	262
Highest	926.5	261

Result plot as follows:

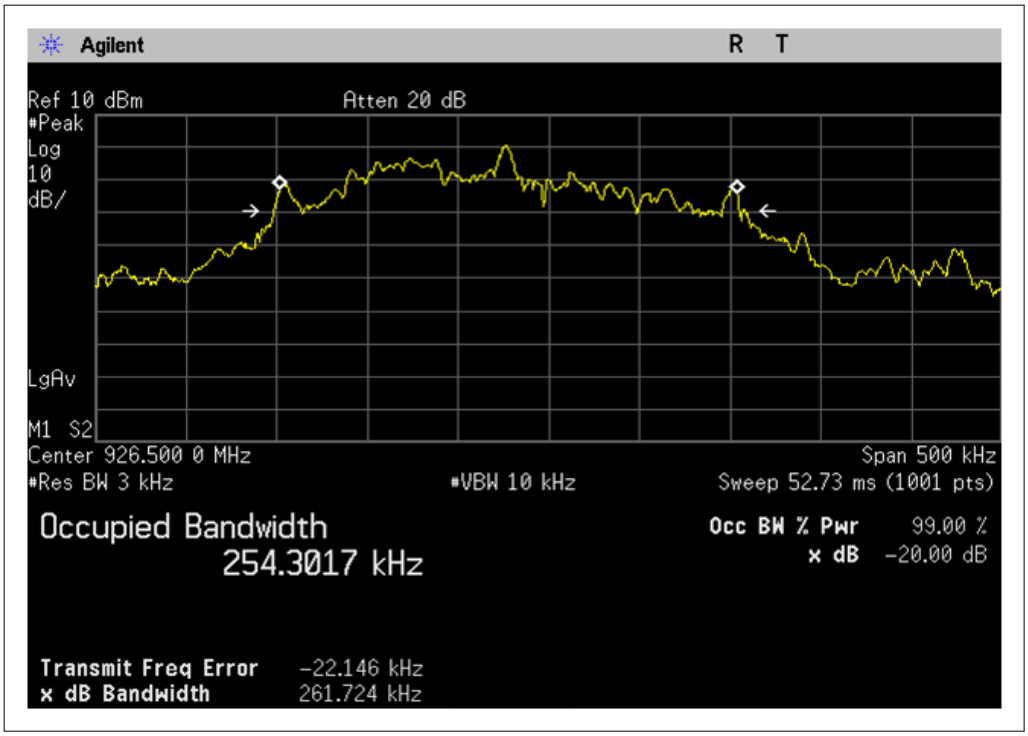
Lowest Channel(903 MHz):



Middle Channel(915 MHz):



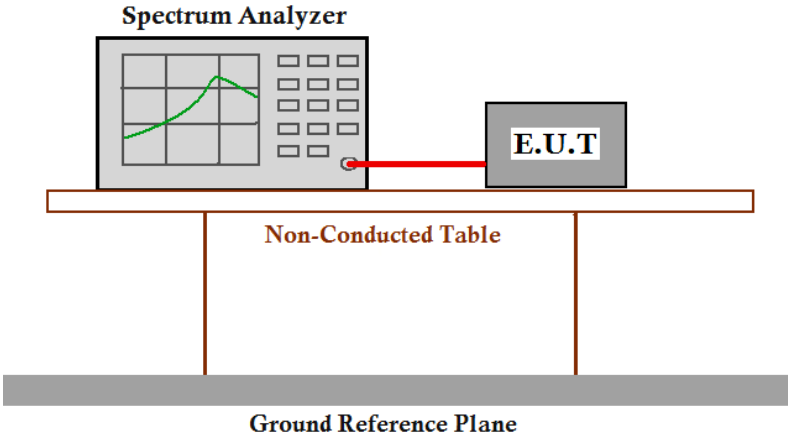
Highest Channel(926.5 MHz):



5.4. Carrier Frequencies Separated

Test Requirement:	FCC Part 15 C section 15.247 (a)(1) Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.
Test Method:	ANSI C63.10: Clause 7.7.2
Test Status:	Pre-test the EUT in hopping mode at the lowest (903 MHz), middle (915 MHz) and highest (926.5 MHz) channel

Test Configuration:



Test Procedure:

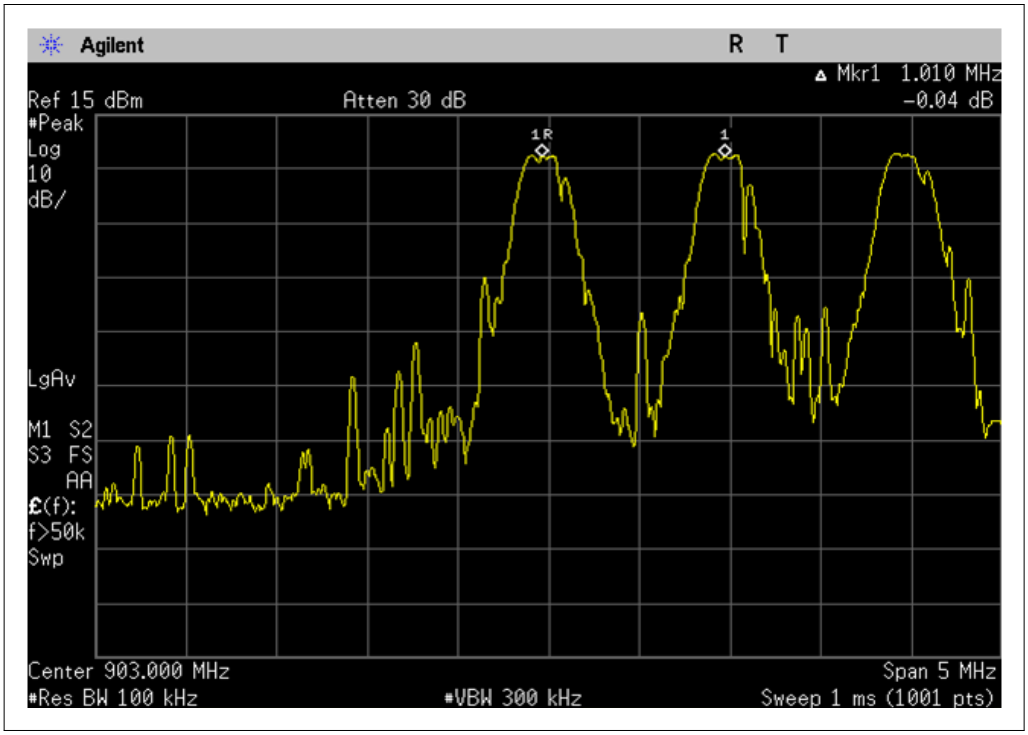
1. Remove the antenna from the EUT and then connect a low attenuation RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: RBW >= 1% of the span, VBW >= RBW; Sweep = auto; Detector Function = Peak. Trace = Max, hold.
3. Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels. The limit is specified in one of the subparagraphs of this Section. Submit this plot.

Test result:

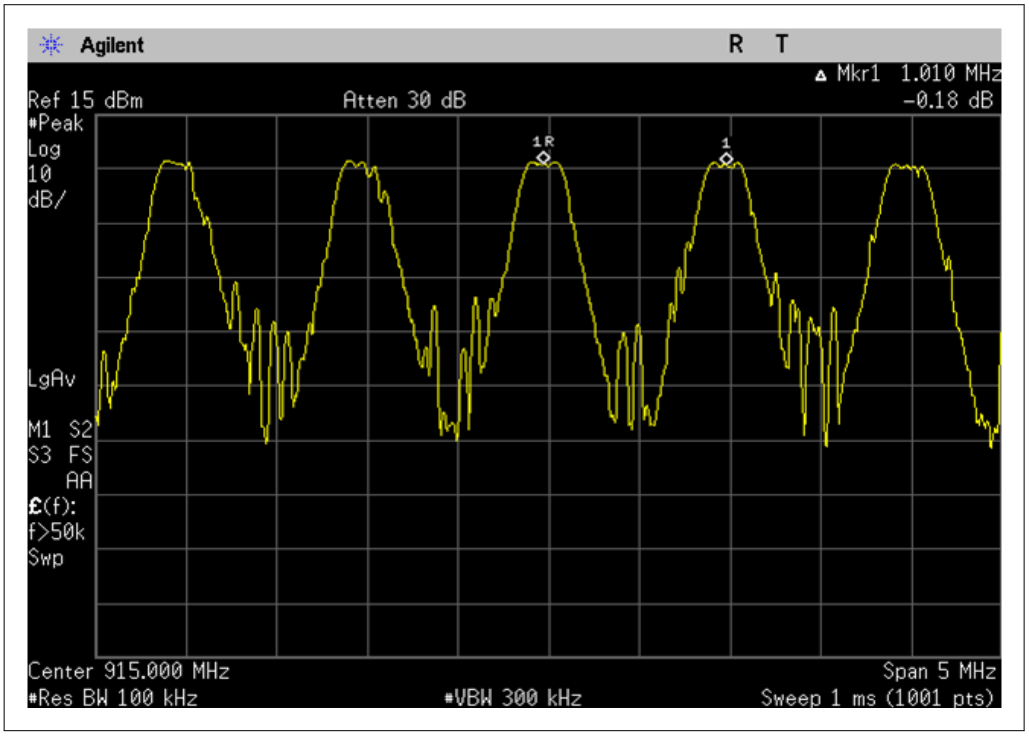
Test Channel	Carrier Frequencies Separated	Pass/Fail
Lower Channels (channel 0 and channel 1)	1010 kHz	Pass
Middle Channels (channel 24 and channel 25)	1010 kHz	Pass
Upper Channels (channel 46 and channel 47)	500kHz	Pass

Result plot as follows:

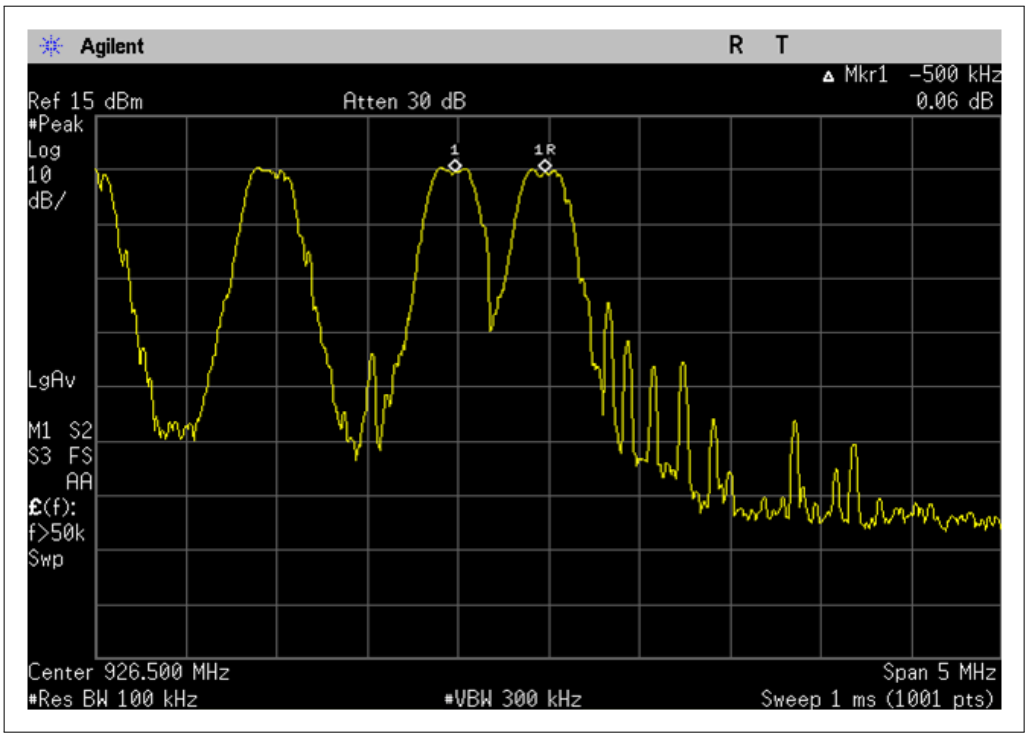
Lowest Channels: Carrier Frequencies Separated



Middle Channels: Carrier Frequencies Separated



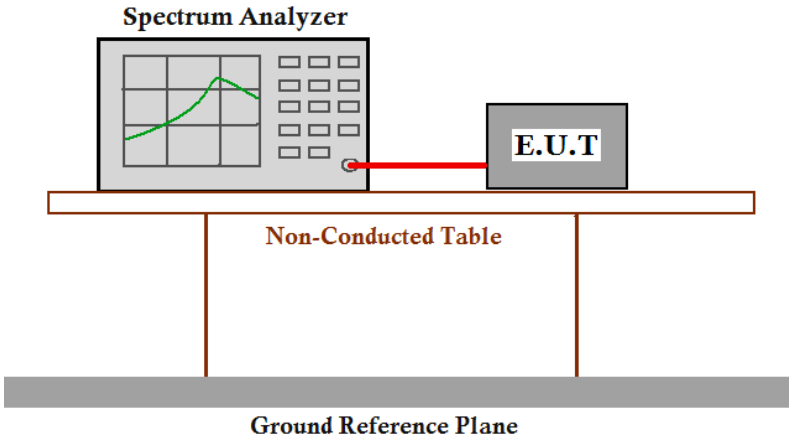
Highest Channels: Carrier Frequencies Separated



5.5. Hopping Channel Number

Test Requirement:	FCC Part15 C section 15.247 (a)(1)(i) For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.
Test Method:	ANSI C63.10: Clause 7.7.3
Test Status:	Pre-test the EUT in hopping mode

Test Configuration:

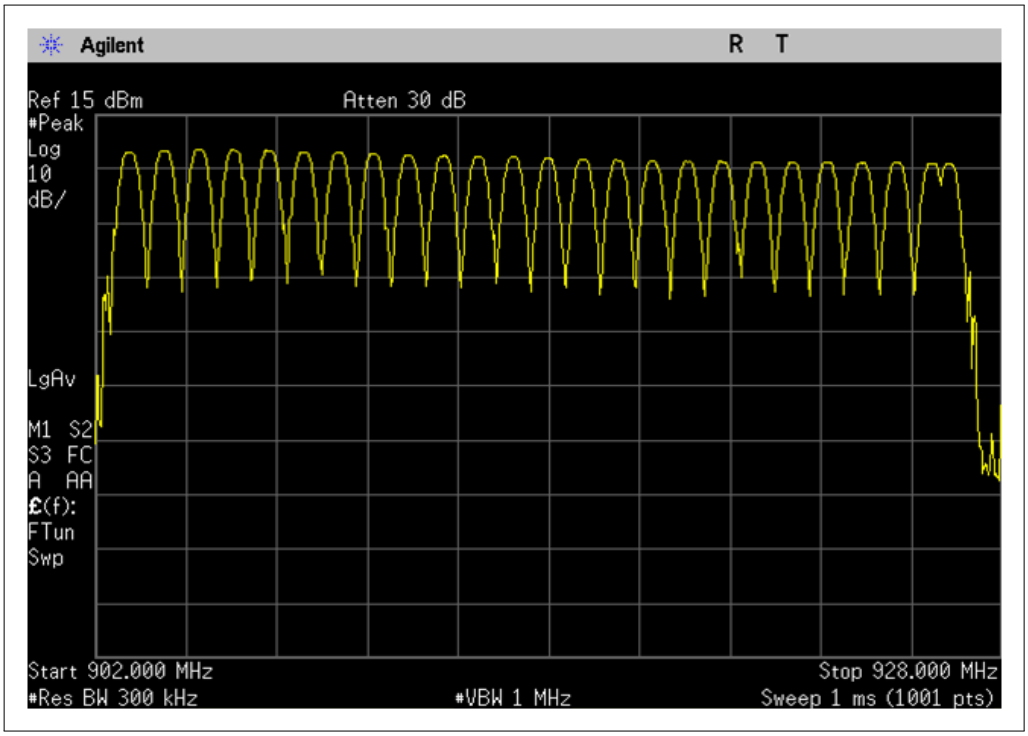


Test Procedure:

1. Remove the antenna from the EUT and then connect a low attenuation RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: RBW = 300 kHz. VBW = 1 MHz. Sweep = auto; Detector Function = Peak. Trace = Max hold.
3. Allow the trace to stabilize. It may prove necessary to break the span up to sections. in order to clearly show all of the hopping frequencies. The limit is specified in one of the subparagraphs of this Section.
4. Set the spectrum analyzer: start frequency = 902 MHz. stop frequency = 928 MHz. Submit the test result graph.

Test result:

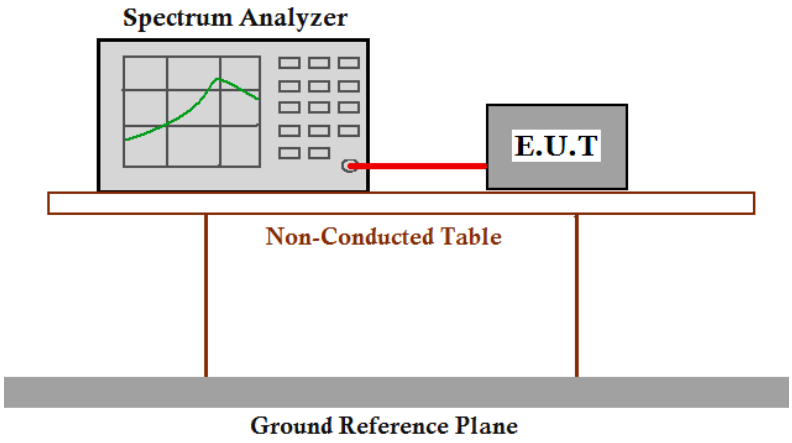
Total channels are 25 hopping channels.



5.6. Dwell Time

Test Requirement:	FCC Part15 C section 15.247 (a)(1)(i) For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.
Test Method:	ANSI C63.10: Clause 7.7.4
Test Status:	Pre-test the EUT in hopping mode

Test Configuration:



Test Procedure:

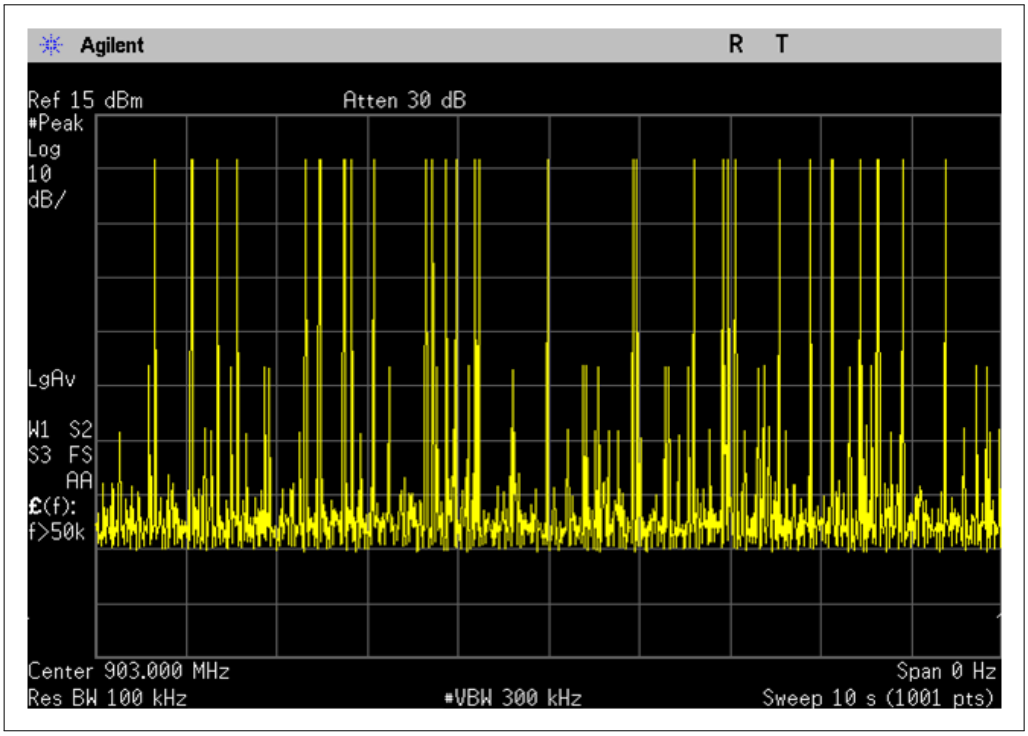
1. Remove the antenna from the EUT and then connect a low attenuation RF cable from the antenna port to the spectrum.
2. Set spectrum analyzer span = 0. centered on a hopping channel;
3. Set RBW = 1 MHz and VBW = 1 MHz. Sweep = as necessary to capture the entire dwell time per hopping channel. Detector Function = Peak. Trace = Max hold;
4. Use the marker-delta function to determine the dwell time. If this value varies with different modes of operation (e.g.. data rate. modulation format. etc.). Repeat this test for each variation. The limit is specified in one of the subparagraphs of this Section. Submit this plot(s). An oscilloscope may be used instead of a spectrum analyzer.

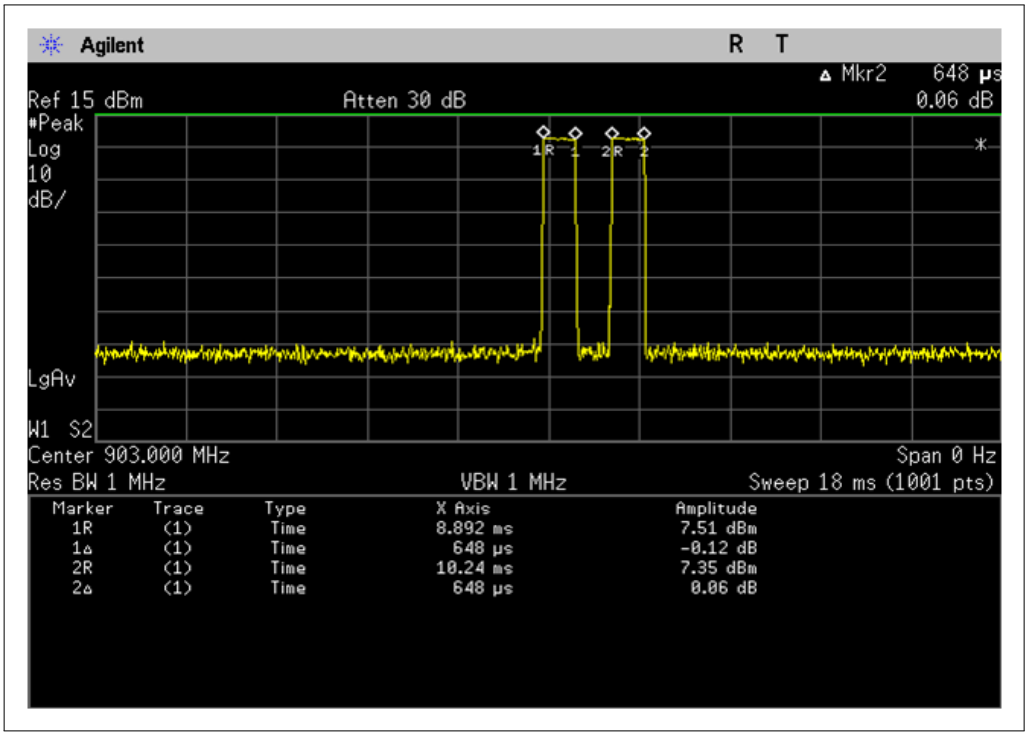
Test Result :

frequency	Pulse Width (msec)	Number of pulse in 10 seconds	Average Time of Occupancy (sec)	Limit (sec)	Verdict
Lowest	1.296	28	0.362	0.4	Pass
Middle	1.296	28	0.362	0.4	Pass
Highest	1.296	28	0.362	0.4	Pass

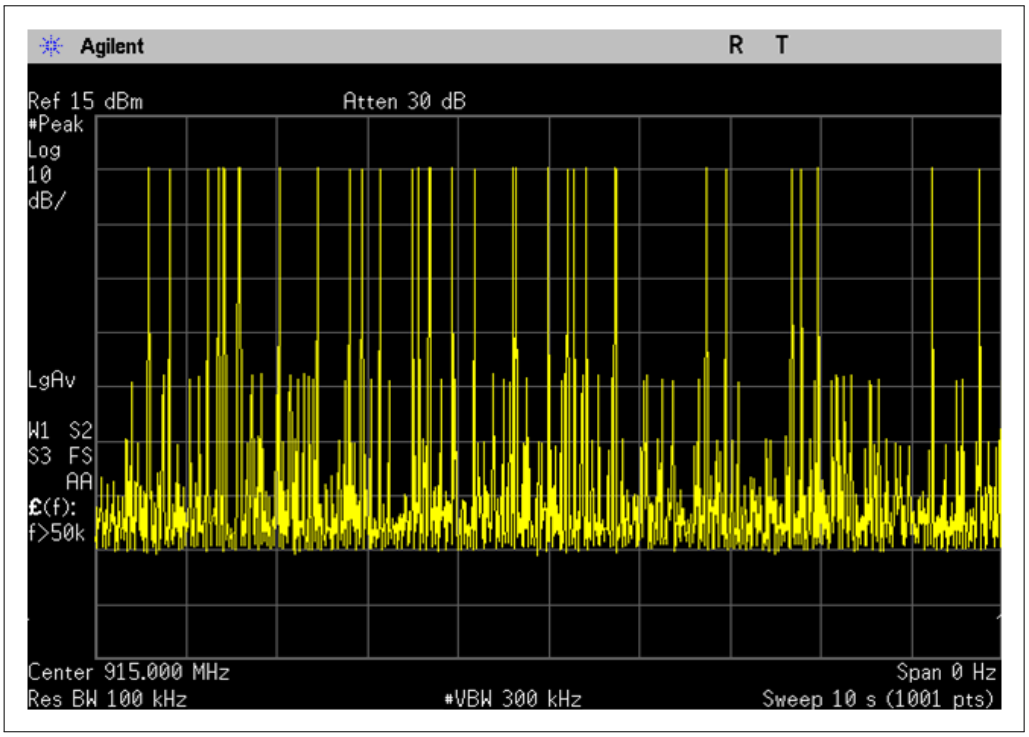
Result plot as follows :

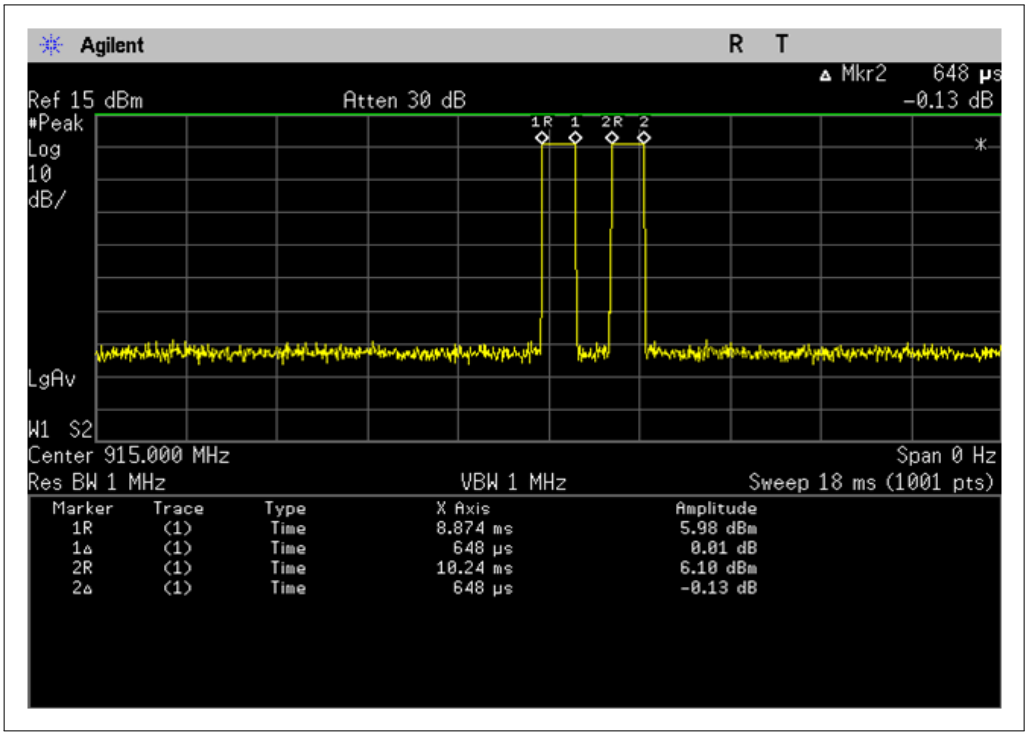
Lowest channel :



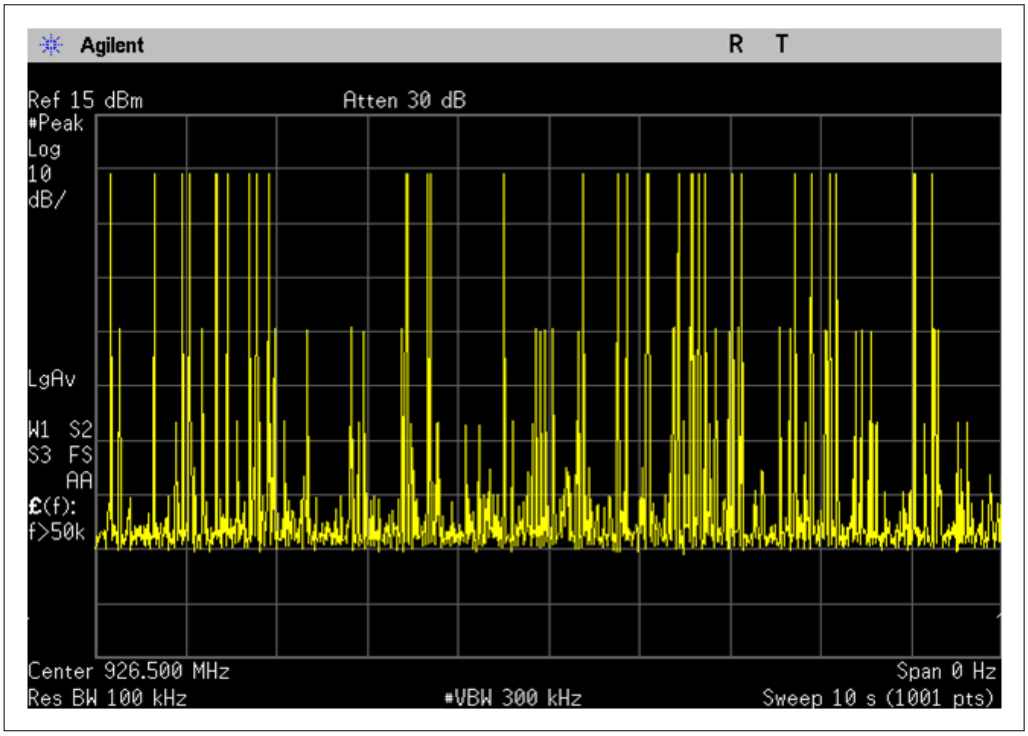


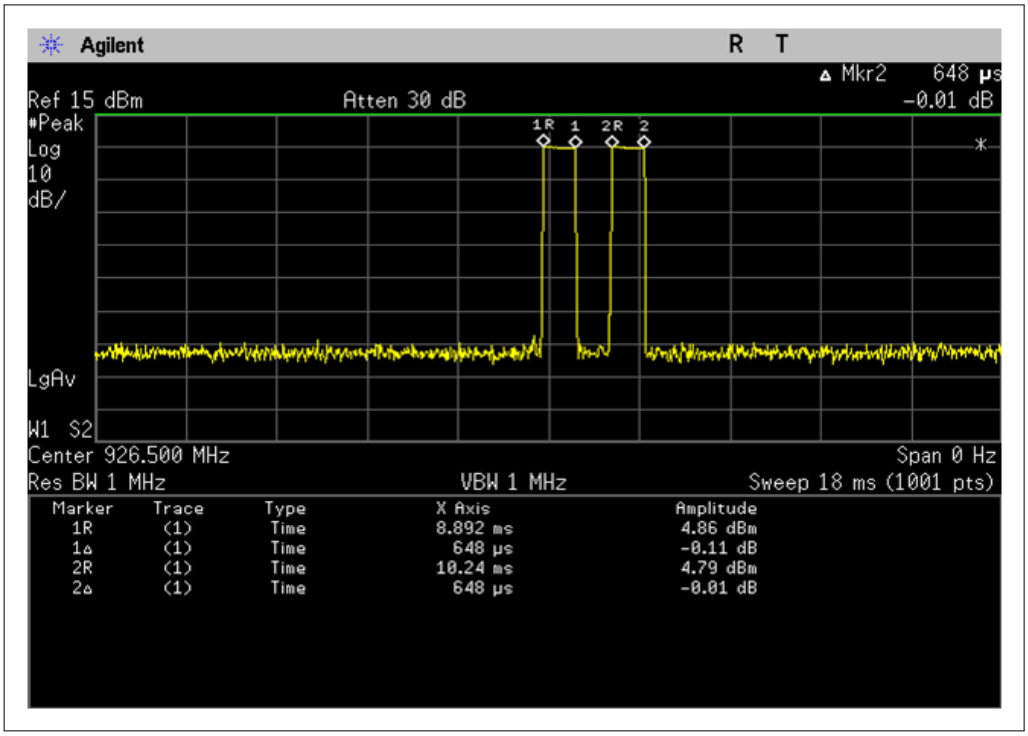
Middle Channel





Highest Channel





5.7. Pseudorandom Frequency Hopping Sequence

5.7.1. Standard requirement

15.247(a)(1) requirement:

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

Alternatively. Frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW. The system shall hop to channel frequencies that are selected at the system hopping rate from a Pseudorandom ordered list of hopping frequencies.

Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

5.7.2. EUT Pseudorandom Frequency Hopping Sequence

It generates a random number using a Gold code generator and Using a random number to select the frequency.

source code is as follows :

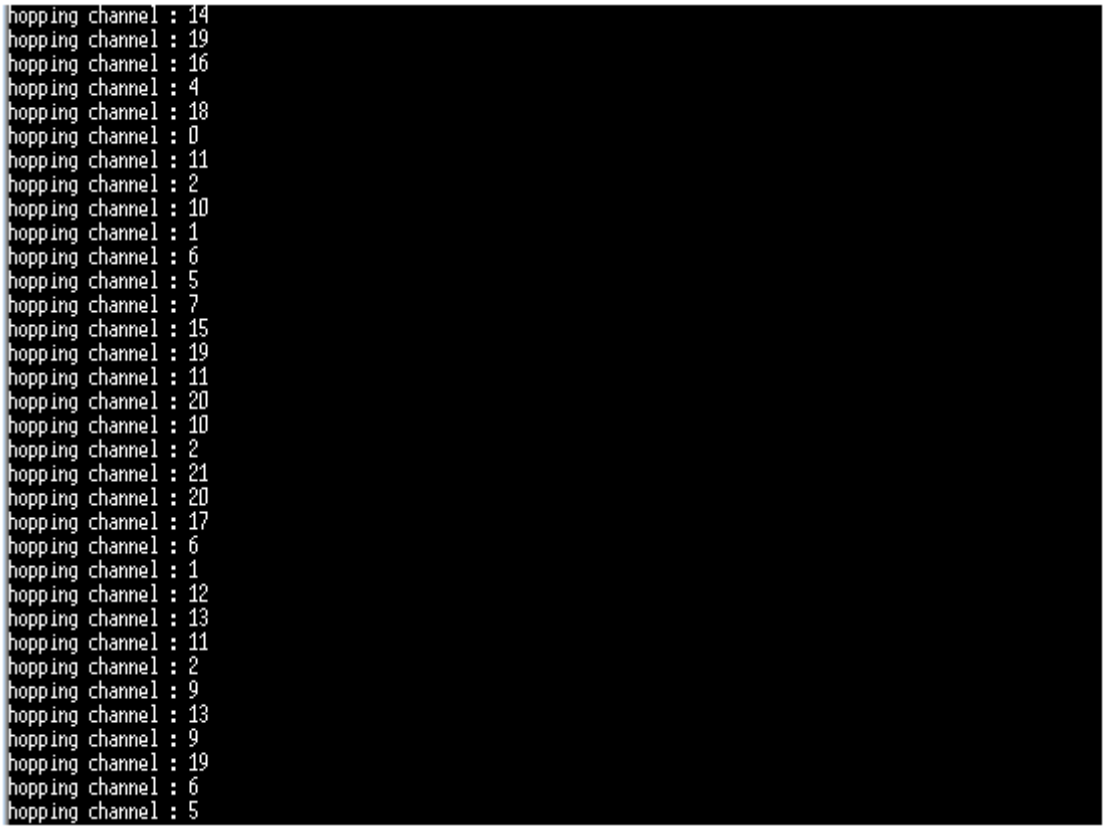
```
unsignedintModem_HoppingSeqGen(unsigned intseqn, unsigned intcnt)
{
 unsignedinti;
 unsignedintnum_of_ones;

 for(i = 0; i<cnt; i++)
 {
 num_of_ones = 0;

 if ( seqn& (1u << 31))
 num_of_ones++;
 if ( seqn& (1 << 21))
 num_of_ones++;
 if ( seqn& (1 << 1))
 num_of_ones++;
 if ( seqn& (1 << 0))
 num_of_ones++;

 if(num_of_ones& (1 << 0))
 seqn = (seqn<< 1) | (1 << 0);
 else
 seqn = (seqn<< 1) & (~(1 << 0));
 }
 returnseqn;
}
```

Actual operating results are as follows:



5.7.3. EUT Equal Hopping Frequency Use

25 Hopping frequencies for channel are selected randomly with hopping seed generator of Master. As a result each of hopping channels is used equally on average.

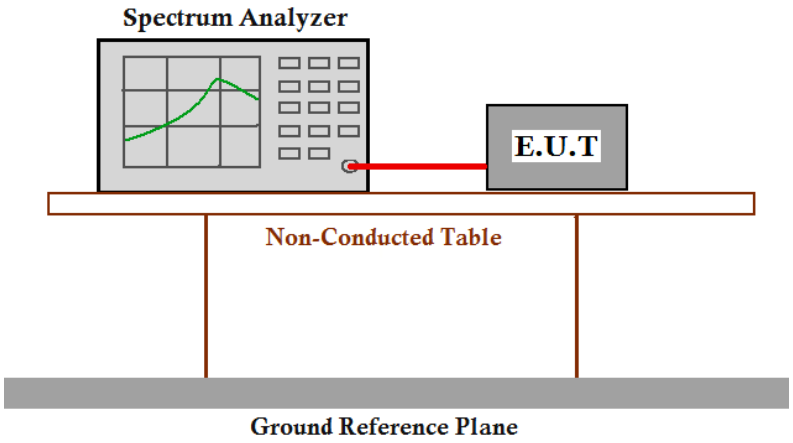
5.7.4. System Receiver Input Bandwidth

Master can have multiple slaves. The master determines the hopping sequence.
Master determines the hopping sequence that clear channel can be found by scanning operation. The slave follows this sequence.
Slave is receiving the sequence via ID setting
Both devices shift between RX and TX time slot according to the clock of the master

5.7.5. System Receiver Hopping Capability

The Frequency Compensation concept is to fine tune RX LO frequency. MCU can read frequency offset, to executes frequency drift calculation and update new setting to adjust the best RX LO frequency.

5.8. Maximum Peak Output Power

Test Requirement:	FCC Part 15 C section 15.247 (b)(2) For frequency hopping systems operating in the 902-928 MHz band: 1 watt for systems employing at least 50 hopping channels; and, 0.25 watts for systems employing less than 50 hopping channels, but at least 25 hopping channels, as permitted under paragraph (a)(1)(i) of this section.
Test Method:	ANSI C63.10: Clause 6.10.1
Test Status:	Pre-test the EUT in continuous transmitting mode at the lowest (903 MHz), middle (915 MHz) and highest (926.5 MHz) channel
Test Configuration:	

Test Procedure:

1 . Remove the antenna from the EUT and then connect a low attenuation RF cable from the antenna port to the spectrum.

2 . Set the spectrum analyzer: RBW = 300 KHz. VBW = 1 MHz. Sweep = auto; Detector Function = Peak.

3 . Keep the EUT in transmitting at lowest, medium and highest channel individually. Record the max value.

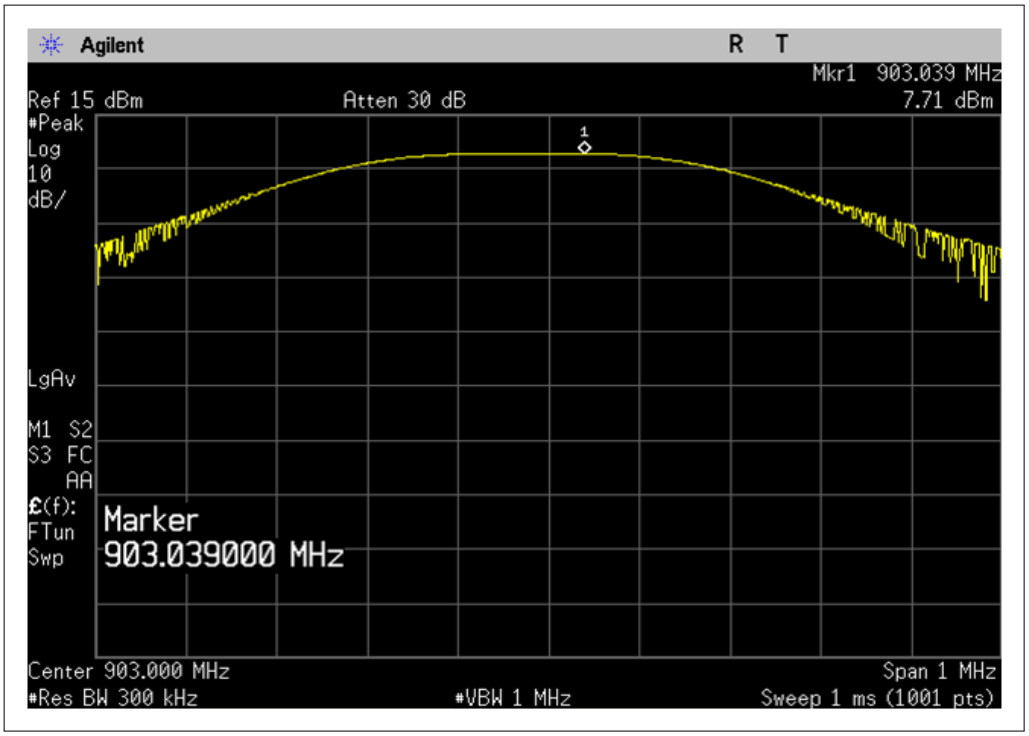
Test result :

Normal mode:

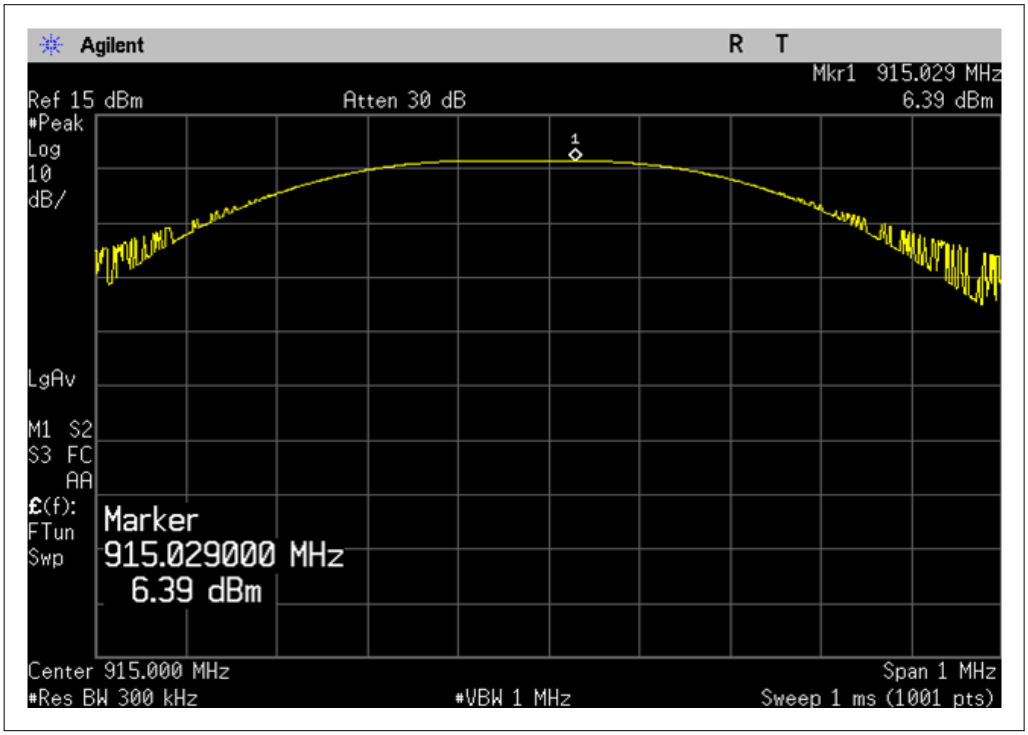
Test Channel	Frequency (MHz)	Output Power		Limit (W)	Result
		(dBm)	(W)		
Lowest	903	7.71	0.0059	0.25	Pass
Middle	915	6.39	0.0043	0.25	Pass
Highest	926.5	5.32	0.0034	0.25	Pass

Result plot as follows :

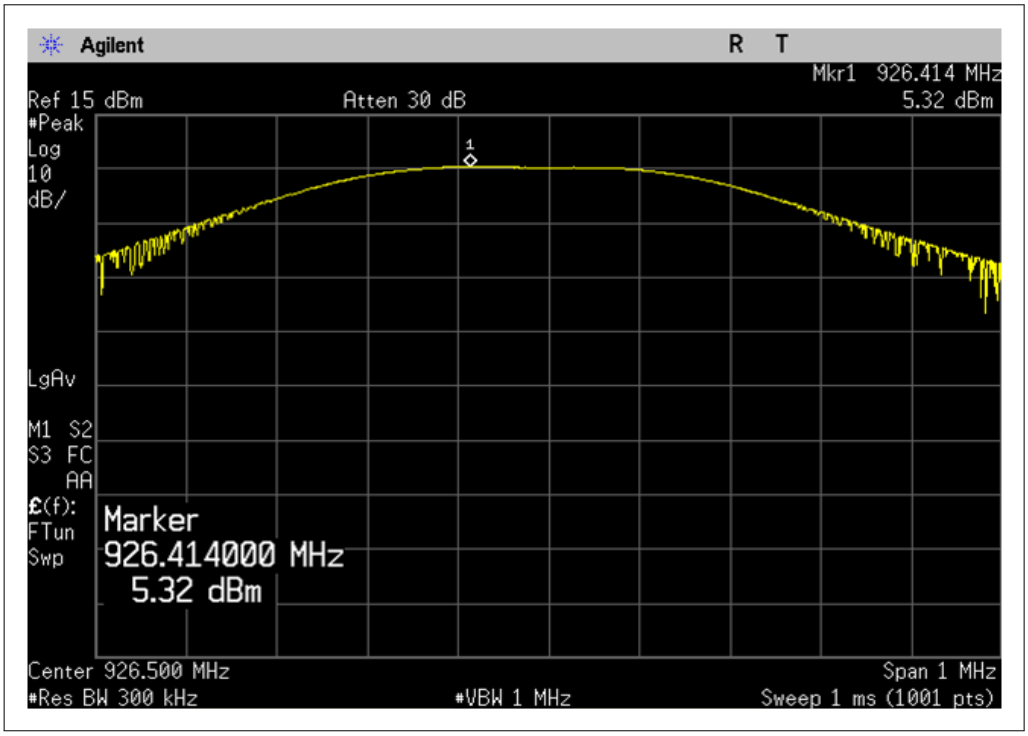
Lowest Channel(903 GHz):



Middle Channel(915 GHz):



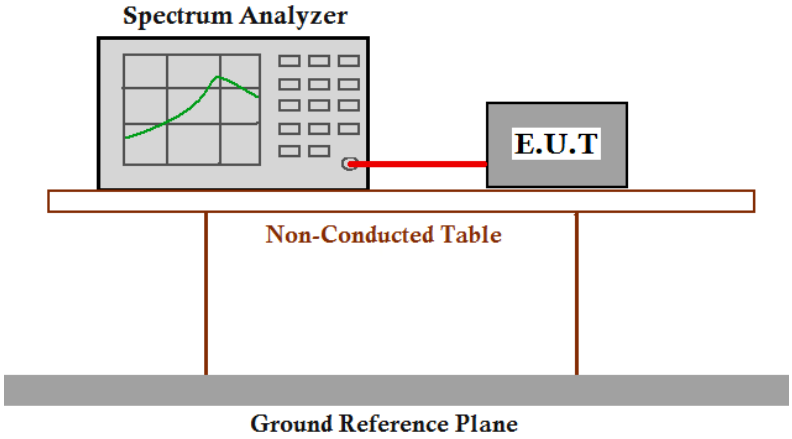
Highest Channel(926.5 GHz):



5.9. Conducted Spurious Emissions

Test Requirement:	FCC Part15 C section 15.247 (d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating. The radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power. Based on either an RF conducted or a radiated measurement. Provided the transmitter demonstrates compliance with the peak conducted power limits.
Test Method:	ANSI C63.10: Clause 6.7
Test Status:	Pre-test the EUT in continuous transmitting mode at the lowest (903 MHz), middle (915 MHz) and highest (926.5 MHz) channel

Test Configuration:

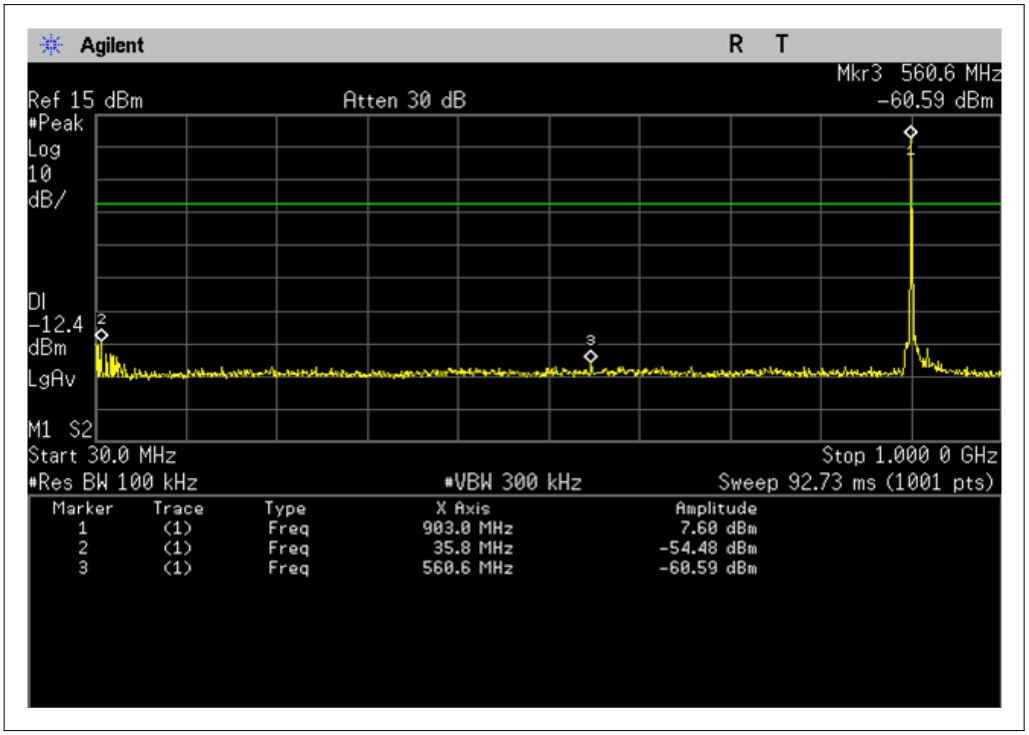


Test Procedure:

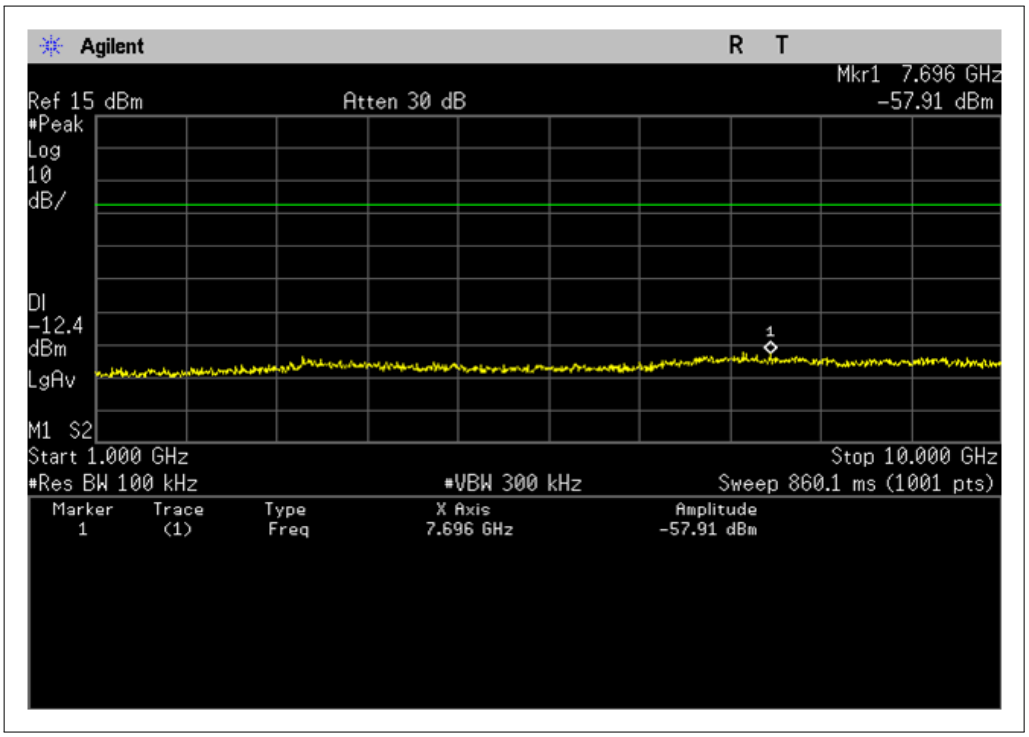
1. Remove the antenna from the EUT and then connect a low attenuation RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: RBW = 100 kHz. VBW >= RBW. Sweep = auto; Detector Function = Peak (Max. hold).

Result plot as follows :

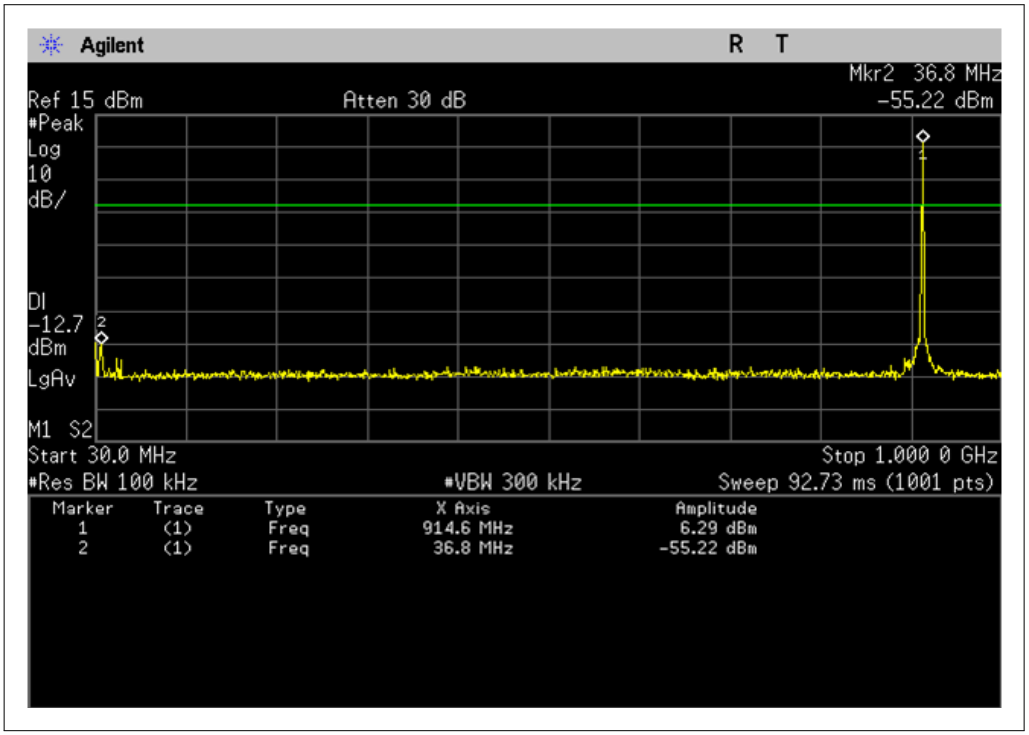
Lowest Channel: 30 MHz to 1 GHz



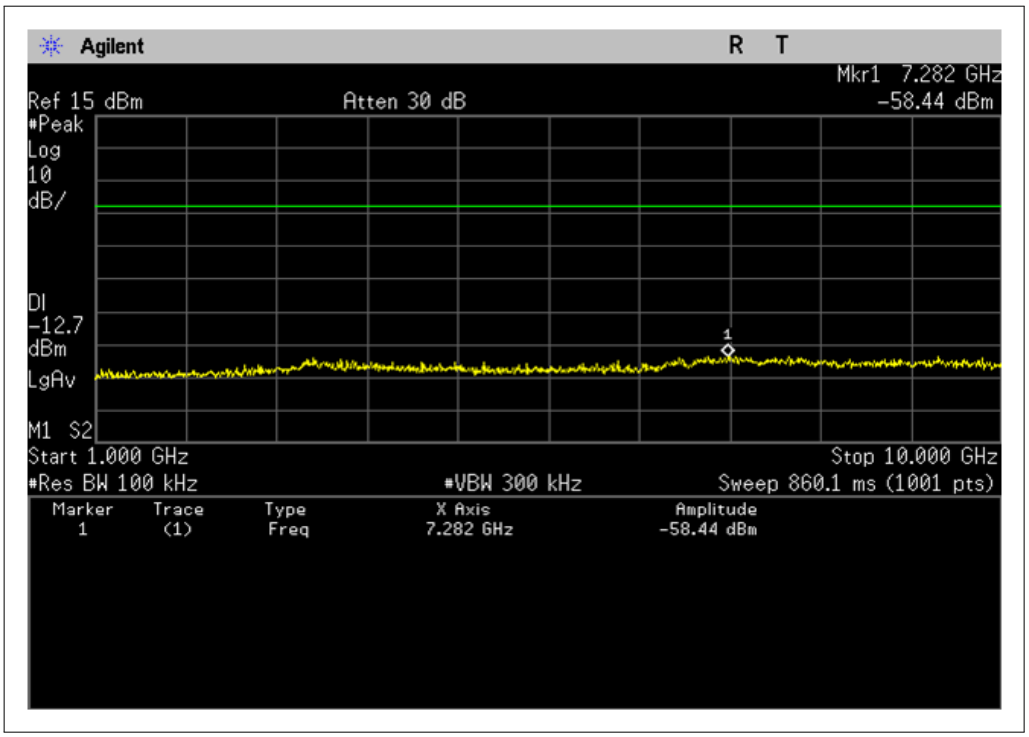
Lowest Channel: 1 GHz to 10 GHz



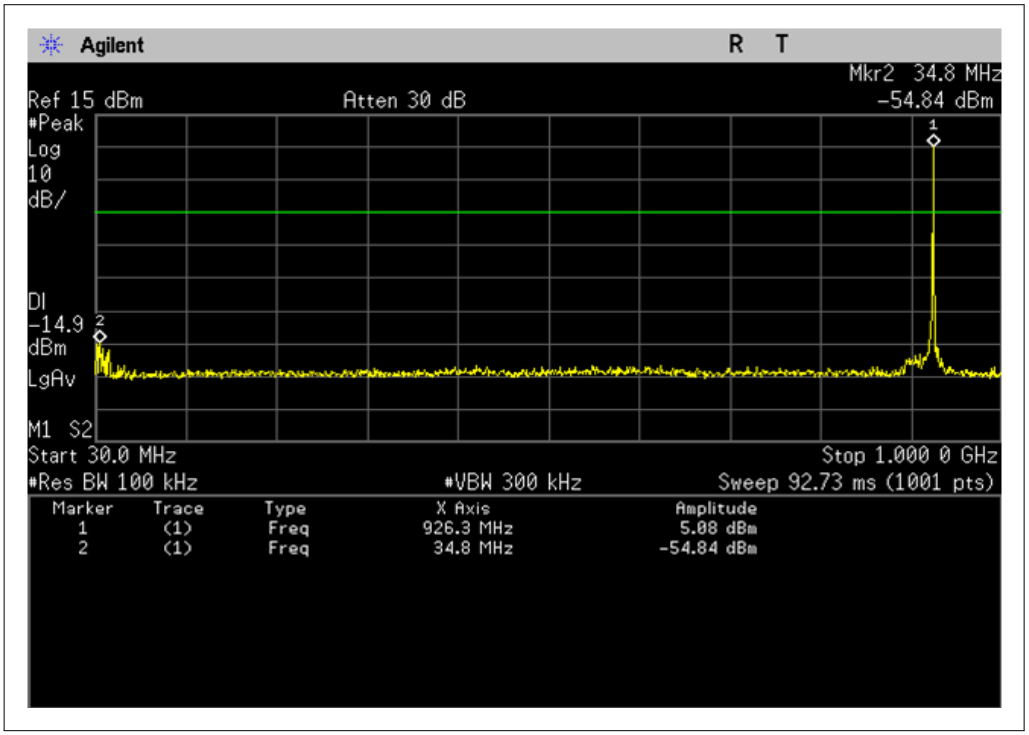
Middle Channel: 30 MHz to 1 GHz



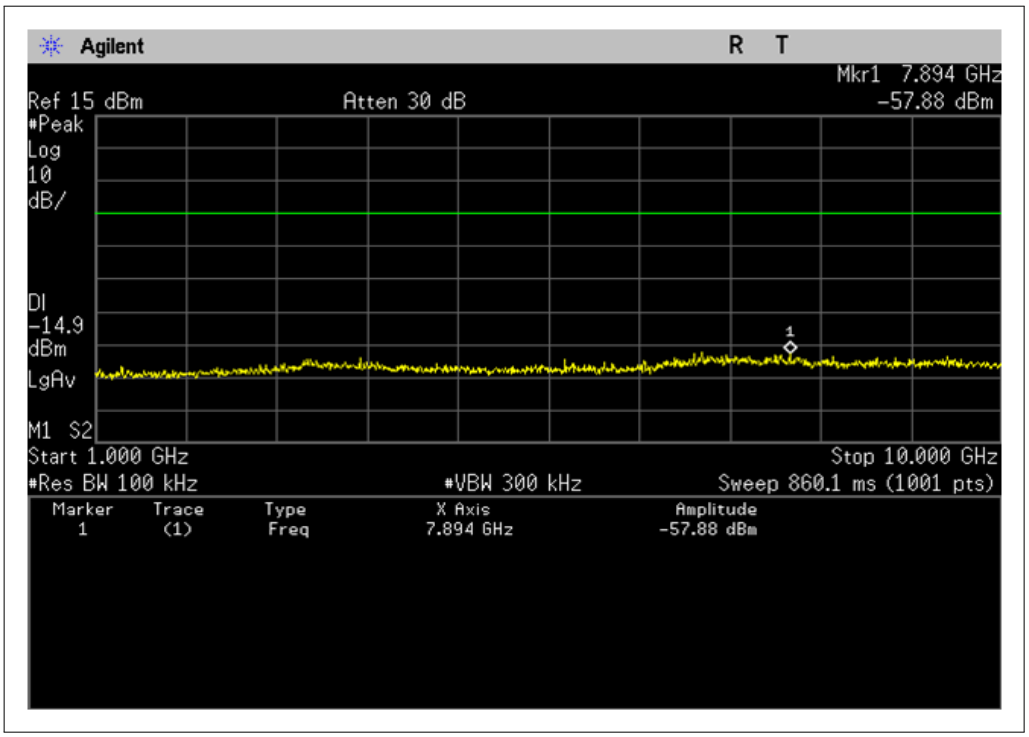
Middle Channel: 1 GHz to 10 GHz



Highes Channel: 30 MHz to 1 GHz



Highes Channel: 1 GHz to 10 GHz

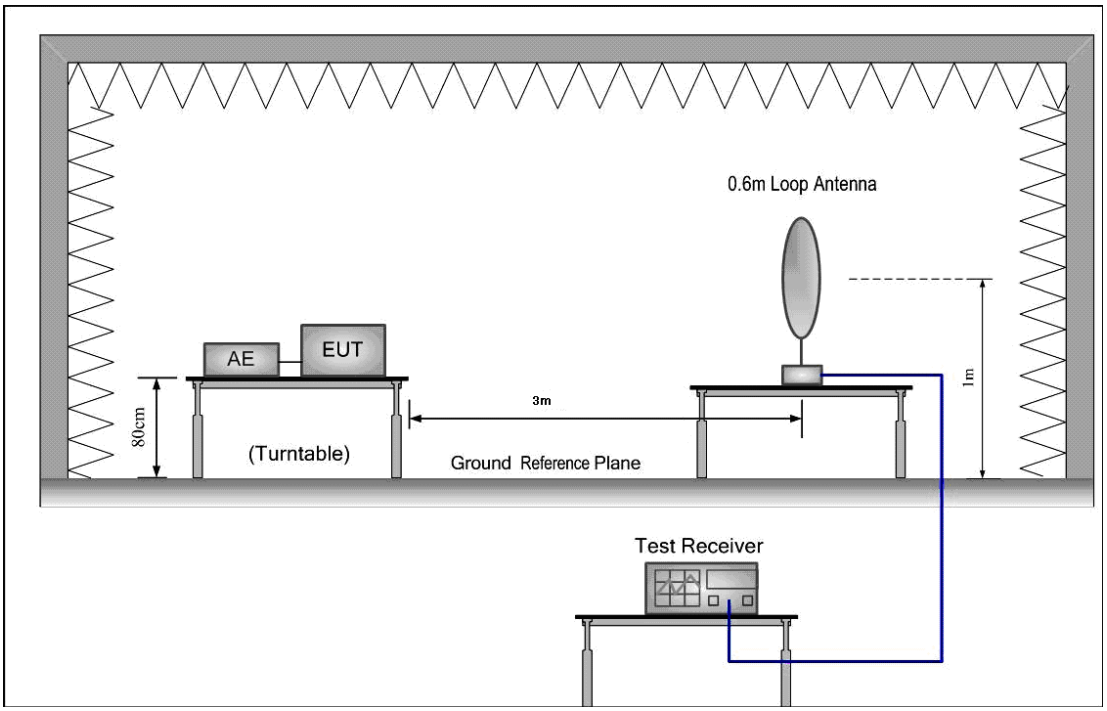


5.10. Radiated Spurious Emissions

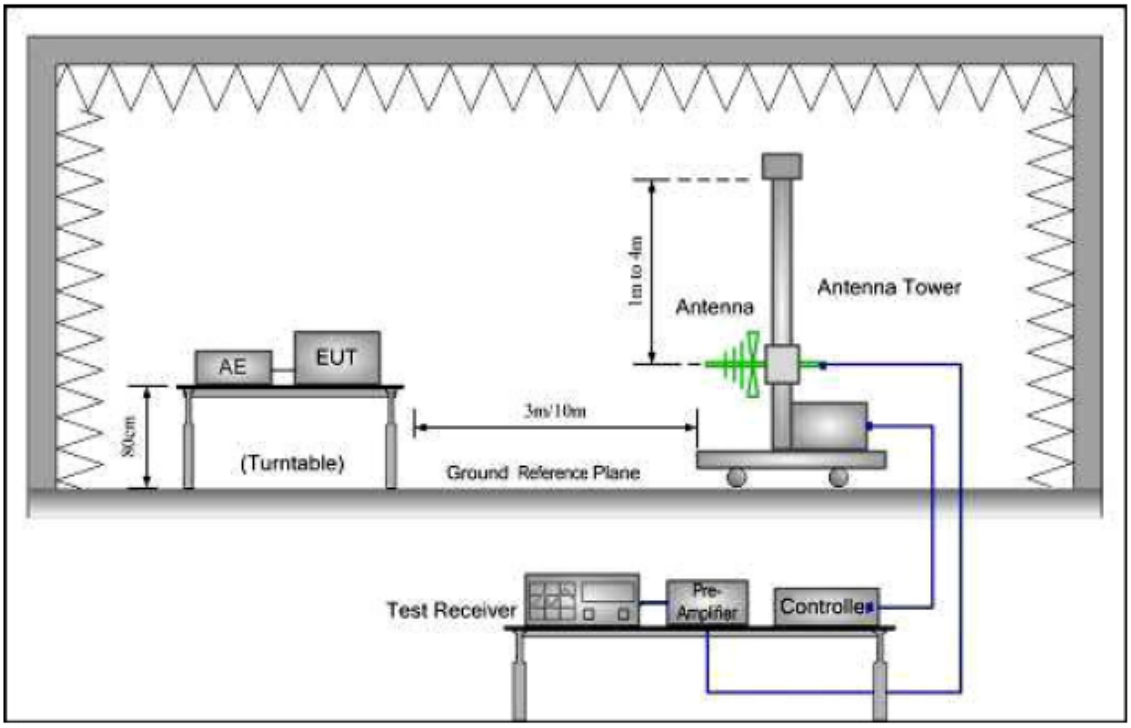
Test Requirement:	FCC Part15 C section 15.247 (d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating. The radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that Contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, and provided the transmitter demonstrates compliance with the peak conducted power limits.
Test Method:	ANSI C63.10: Clause 6.4, 6.5 and 6.6
Test Status:	Pre-test the EUT in continuous transmitting mode at the lowest (903 MHz), middle (915 MHz) and highest (926.5 MHz) channel
Detector:	For PK value: RBW = 1 MHz for f ³ 1 GHz, 100 kHz for f < 1 GHz VBW ³ RBW Sweep = auto Detector function = peak Trace = max hold For AV value: RBW = 1 MHz for f ³ 1 GHz, 100 kHz for f < 1 GHz VBW =10 Hz Sweep = auto Detector function = peak Trace = max hold
15.209 Limit:	40.0 dBμV/m between 30MHz & 88MHz 43.5 dBμV/m between 88MHz & 216MHz 46.0 dBμV/m between 216MHz & 960MHz 54.0 dBμV/m above 960MHz

Test Configuration:

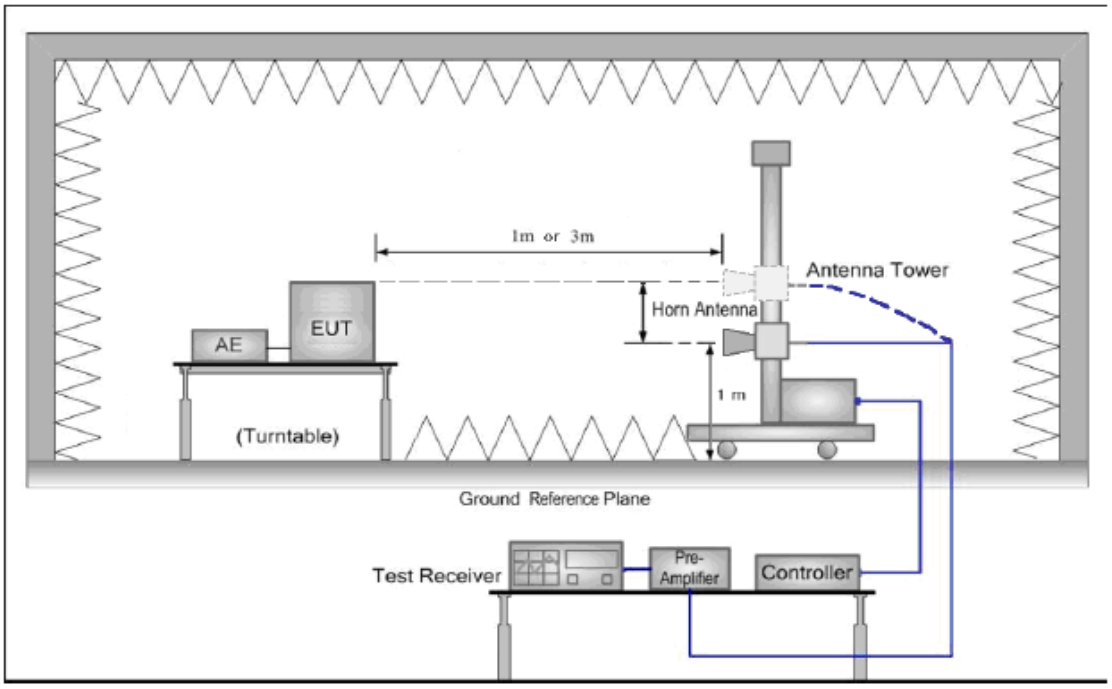
1) 9 kHz to 30 MHz emissions:



2) 30 MHz to 1 GHz emissions:



3) 1 GHz to 10 GHz emissions:



Test Procedure:

Test site with RF absorbing material covering the ground plane that met the site validation criterion called out in CISPR 16-1-4:2007 was used to perform radiated emission test above 1 GHz. The receiver scanned from the lowest frequency generated within the EUT to 25GHz.When an emission was found, the table was rotated to produce the maximum signal strength. An initial pre-scan was performed for in peak detection mode using the receiver. The EUT was measured for both the Horizontal and Vertical polarities and performed a pre-test three orthogonal planes. For intentional radiators, measurements of the variation of the input power or the radiated signal level of the fundamental frequency component of the emission, as appropriate, shall be performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage. The worst case emissions were reported.

For hand-held or body-worn devices rotated through three orthogonal axes(X,Y,Z) to determine which attitude (orientation) and equipment arrangement produces the highest emission relative to the limit; the attitude and equipment arrangement that produces the highest emission relative to the limit was used in making final radiated emission measurements. Now set the VBW to 10 Hz, while maintaining all of the other instrument settings. This peak level, once corrected, must comply with the limit specified in Section 15.209. If the dwell time per channel of the hopping signal is less than 100 ms, then the reading obtained with the 10 Hz VBW may be further adjusted by a "duty cycle correction factor", derived from 20log(dwell time/100 ms), in an effort to demonstrate compliance with the 15.209 limit. Submit this data.

5.10.1. Harmonic and other spurious emissions

5.10.1.1. Test at low Channel in transmitting status

9 kHz~30 MHz Field Strength of Unwanted Emissions. Quasi-Peak Measurement

The measurements with active loop antenna were greater than 20dB below the limit, so the test data were not recorded in the test report.

30 MHz~1 GHz Spurious Emissions. Quasi-Peak Measurement

Quasi-peak measurement

Frequency (MHz)	Detect Mode	Polarization (V/H)	Measured Value (dBμV)	Antenna Factor + Cable Loss (dB/m)	Emission Level (dBμV/m)	Limit (dBμV/m)
49.65	QP	H	26.98	10.89	16.09	40.0
60.67	QP	V	28.46	13.88	14.58	40.0
102.59	QP	H	28.80	12.83	15.97	43.5
250.62	QP	H	28.98	14.33	14.65	46.0
860.14	QP	H	41.02	15.93	25.09	46.0

1~10 GHz Harmonics & Spurious Emissions. Peak & Average Measurement

Peak / Average Measurement:

Frequency (MHz)	Polarization (V/H)	Measured Value (dBμV)	Antenna Factor + Cable Loss (dB/m)	Amplifier Gain (dB)	Emission Level (dBμV/m)	Limit (dBμV/m)
The amplitude of spurious emissions that are attenuated by more than 20 dB below the permissible value has no need to be reported.						

5.10.1.2. Test at middle Channel in transmitting status

9 kHz~30 MHz Field Strength of Unwanted Emissions. Quasi-Peak Measurement

The measurements with active loop antenna were greater than 20dB below the limit, so the test data were not recorded in the test report.

30 MHz~1 GHz Spurious Emissions. Quasi-Peak Measurement

Quasi-peak measurement

Frequency (MHz)	Detect Mode	Polarization (V/H)	Measured Value (dBμV)	Antenna Factor + Cable Loss (dB/m)	Emission Level (dBμV/m)	Limit (dBμV/m)
49.65	QP	H	26.22	10.89	15.33	40.0
60.67	QP	V	25.92	13.88	12.04	40.0
91.46	QP	H	23.41	12.16	11.25	43.5
102.59	QP	H	23.67	12.83	10.84	43.5
250.62	QP	H	29.62	14.33	15.29	46.0
872.45	QP	H	38.75	25.27	13.48	46.0

1~10 GHz Harmonics & Spurious Emissions. Peak & Average Measurement

Peak / Average Measurement:

Frequency (MHz)	Polarization (V/H)	Measured Value (dBμV)	Antenna Factor + Cable Loss (dB/m)	Amplifier Gain (dB)	Emission Level (dBμV/m)	Limit (dBμV/m)
The amplitude of spurious emissions that are attenuated by more than 20 dB below the permissible value has no need to be reported.						

5.10.1.3. Test at high Channel in transmitting status

9 kHz~30 MHz Field Strength of Unwanted Emissions. Quasi-Peak Measurement

The measurements with active loop antenna were greater than 20dB below the limit, so the test data were not recorded in the test report.

30 MHz~1 GHz Spurious Emissions. Quasi-Peak Measurement

Quasi-peak measurement

Frequency (MHz)	Detect Mode	Polarization (V/H)	Measured Value (dBμV)	Antenna Factor + Cable Loss (dB/m)	Emission Level (dBμV/m)	Limit (dBμV/m)
49.65	QP	H	27.45	10.89	16.56	40.0
60.67	QP	V	26.89	13.88	13.01	40.0
91.46	QP	H	21.95	12.16	9.79	43.5
102.59	QP	H	22.44	12.83	9.61	43.5
250.62	QP	H	26.66	14.33	12.33	46.0
888.09	QP	H	31.83	25.50	6.33	46.0

1~10 GHz Harmonics & Spurious Emissions. Peak & Average Measurement

Peak / Average Measurement:

Frequency (MHz)	Polarization (V/H)	Measured Value (dBμV)	Antenna Factor + Cable Loss (dB/m)	Amplifier Gain (dB)	Emission Level (dBμV/m)	Limit (dBμV/m)
The amplitude of spurious emissions that are attenuated by more than 20 dB below the permissible value has no need to be reported.						

Remark:

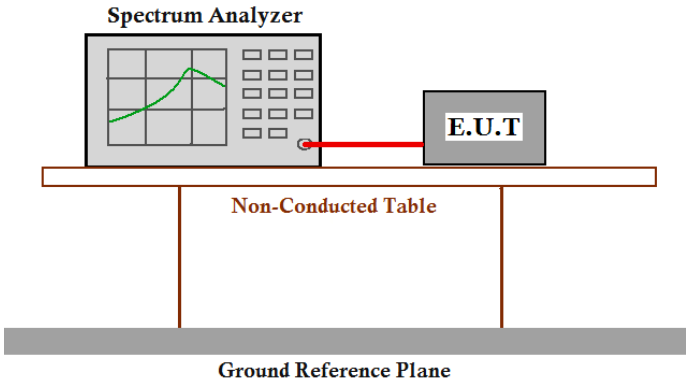
1). The field strength is calculated by adding the Antenna Factor. Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

Final Test Level = Measured Value + Antenna Factor + Cable Loss –Amplifier Gain.

2). As shown in Section, for frequencies above 1000 MHz. the above field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

3). The test only perform the EUT in transmitting status since the test frequencies were over 1GHz only required transmitting status.

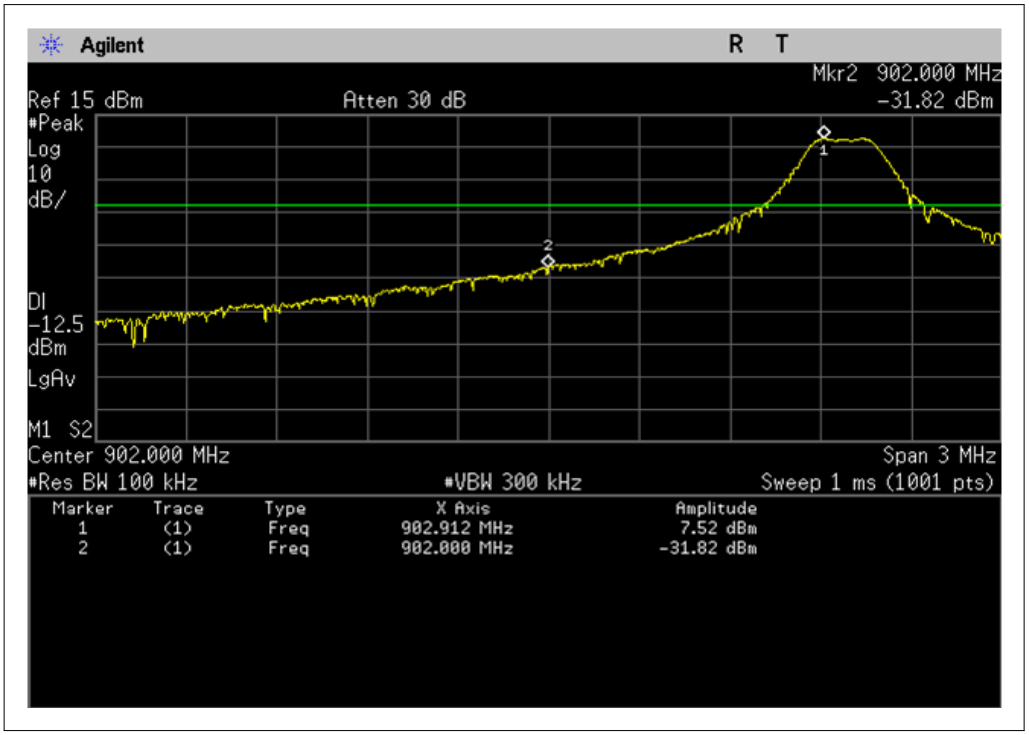
5.11. Band Edges Requirement

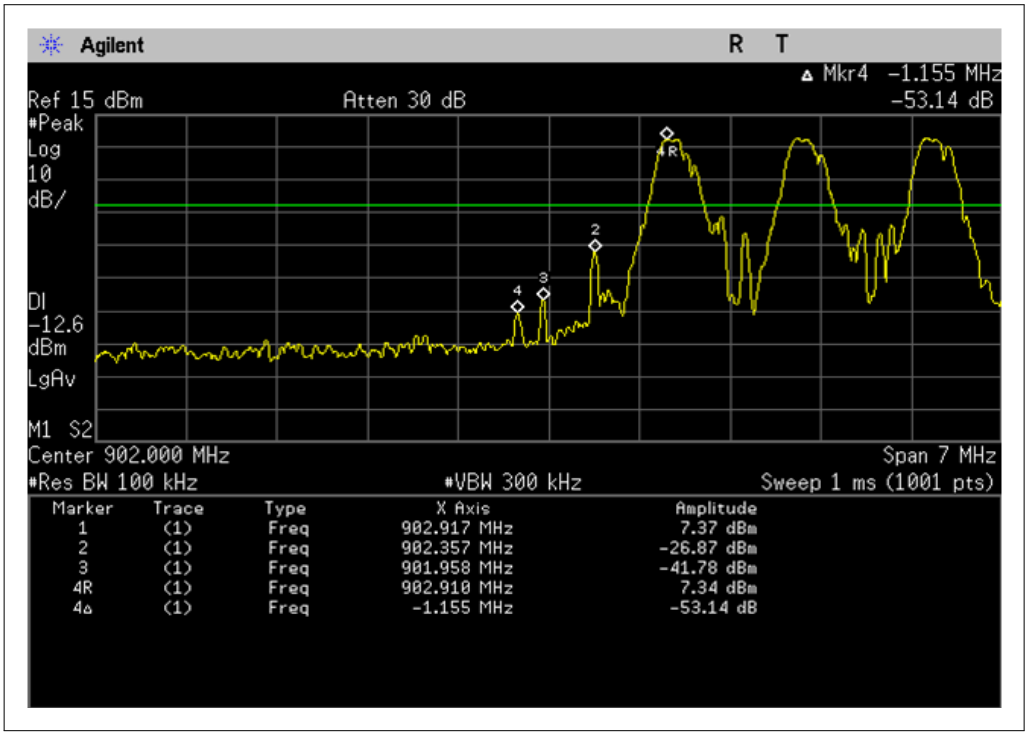
Test Requirement:	FCC Part15 C section 15.247 (d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).
Frequency Band:	902 MHz to 928 MHz
Test Method:	ANSI C63.10: Clause 6.9.2
Test Status:	Pre-test the EUT in continuous transmitting mode at the lowest (903 MHz), middle (915 MHz) and highest (926.5 MHz) channel
Test Configuration:	
Test Procedure:	Set RBW of spectrum analyzer to 100 kHz and VBW of spectrum analyzer to 100 kHz with suitable frequency span including 100 kHz bandwidth from band edge.

The band edges was measured and recorded Result:
The Lower Edges attenuated more than 20dB.
The Upper Edges attenuated more than 20dB.
The graph as below. Represents the emissions take for this device.

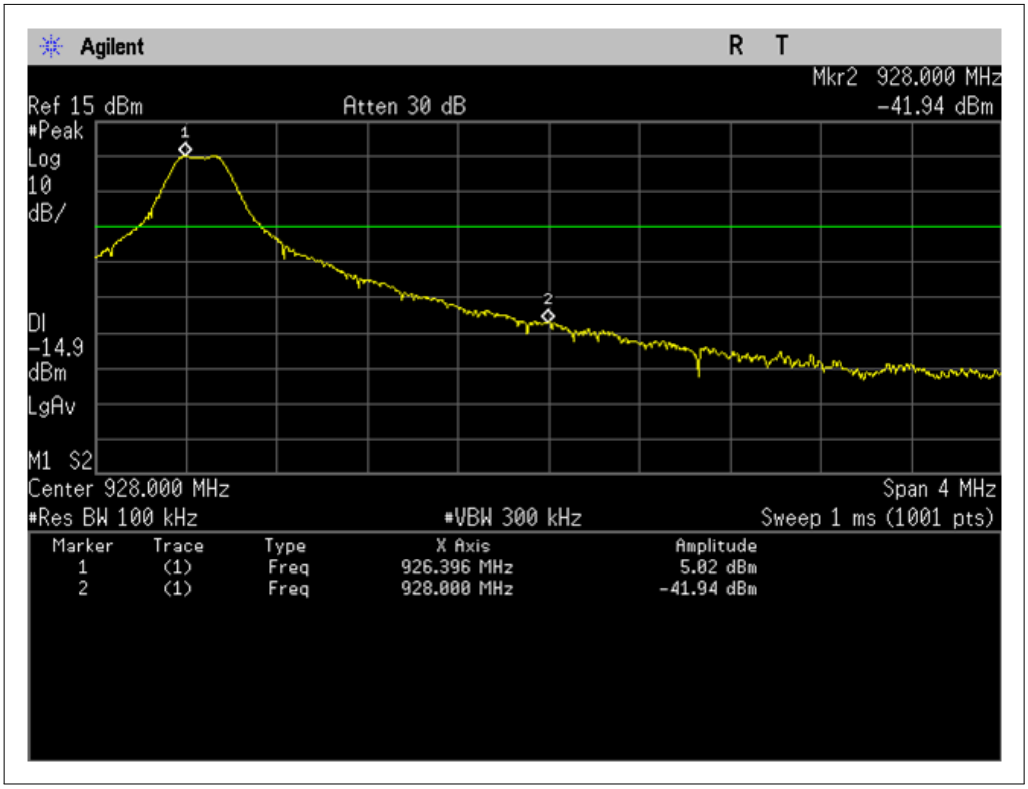
Result plot as follows :

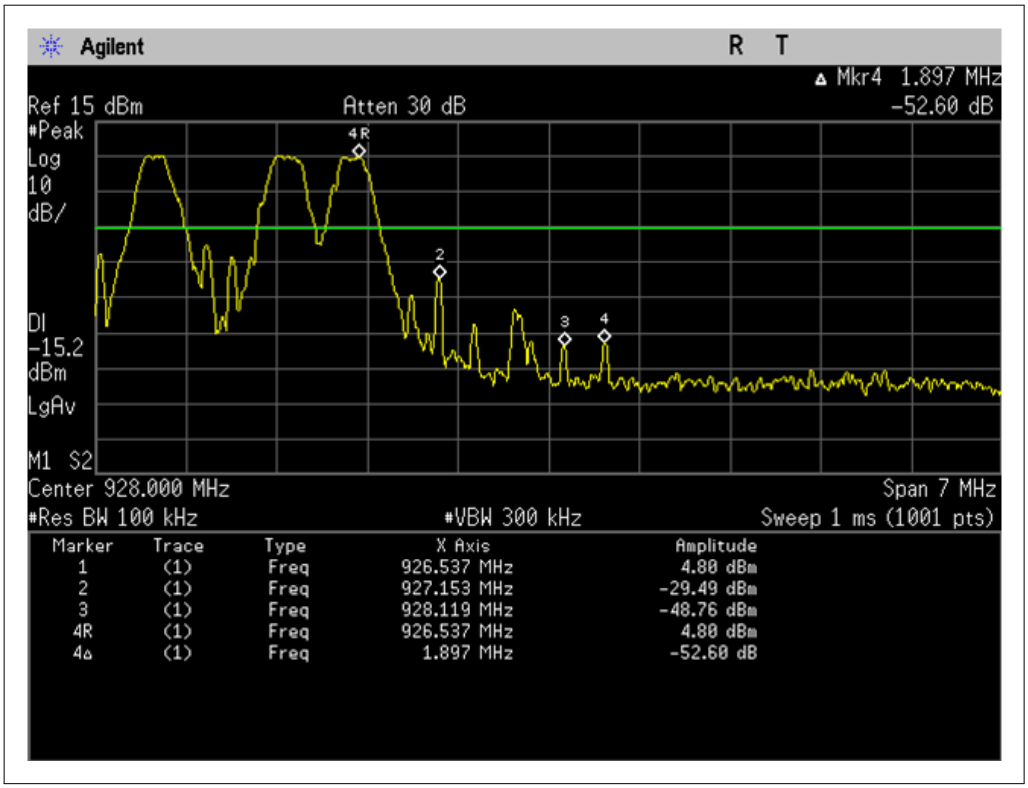
Lowest Channel :





Highest Channel :





5.12. Conducted Emissions at Mains Terminals 150 kHz to 30 MHz

Test Requirement:	FCC Part 15 C section 15.207
Test Method: ANSI C63.10:	Clause 6.2
Frequency Range:	150 kHz to 30 MHz
Detector:	Peak for pre-scan (9 kHz Resolution Bandwidth)

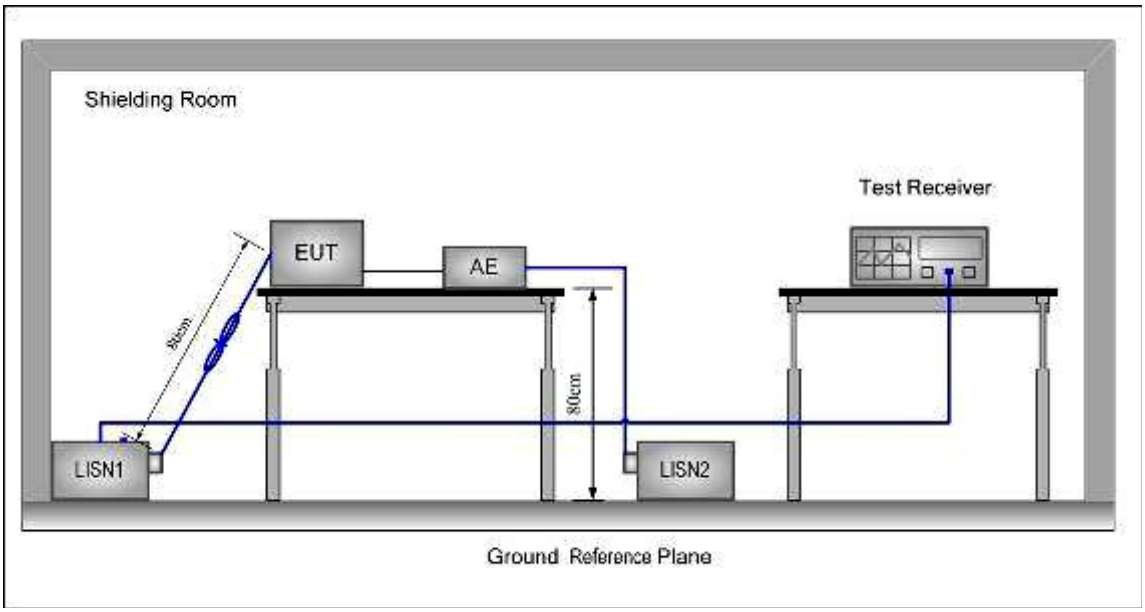
Test Limit

Limits for conducted disturbance at the mains ports of class B

Frequency Range (MHz)	Class B Limit dB(μV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50
NOTE 1 The limit decreases linearly with the logarithm of the frequency in the range 0,15 MHz to 0,50 MHz.		

EUT Operation:	Test in normal operating mode. For intentional radiators, measurements of the variation of the input power or the radiated signal level of the fundamental frequency component of the emission, as appropriate, shall be performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage. Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

Test Configuration:



Test procedure:

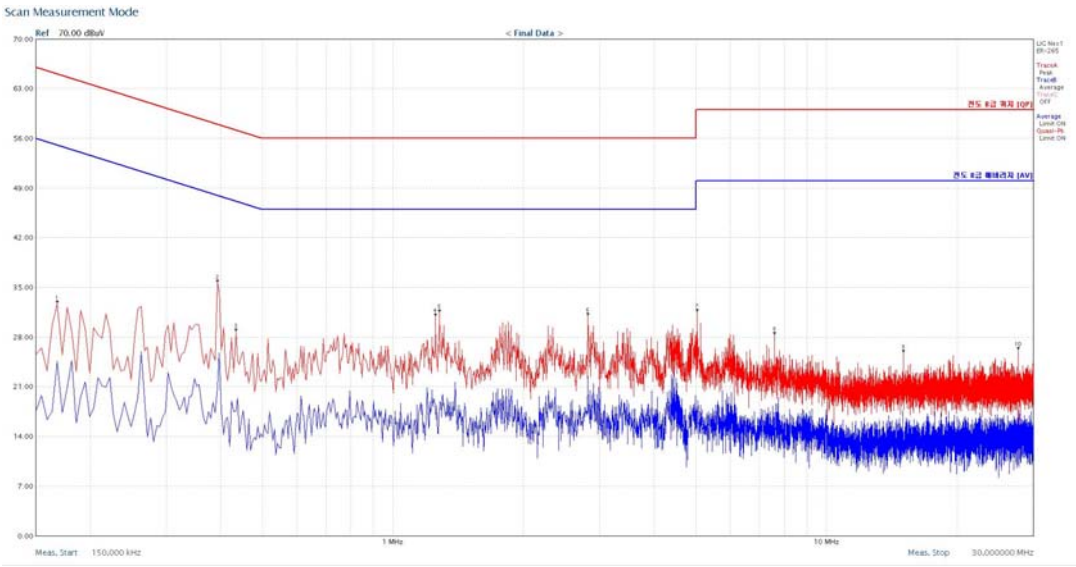
1. The mains terminal disturbance voltage test was conducted in a shielded room.
2. The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50/50μH + 5linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.
3. The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane, but separated from metallic contact with the ground reference plane by 0.1m of insulation.
4. The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0,4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0,8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane.

This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0,8 m from the LISN 2.

5.12.1. Measurement Data (Chage Mode)

Pre-scan was performed with peak detected on all ports, Quasi-peak & average measurements were performed at the frequencies at which maximum peak emission level were detected. Please see the attached Quasi-peak and Average test results.

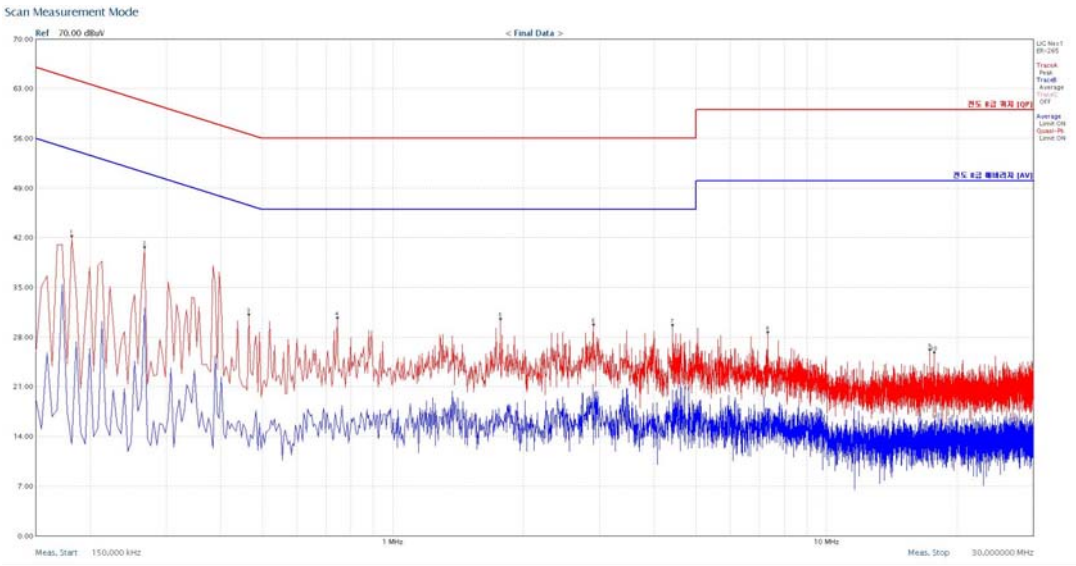
Line - PE(QusiPeak and Average detector used)



REDUCTION TABLE

No	Freq (MHz)	Level (dBuV)	Corr (dB)	Limit (dBuV)	Margin (dB)	State	Reference
1	0.168	32.73	10.24	65.46	32.73	Pass	QP
2	0.262	32.29	10.07	61.43	29.14	Pass	QP
3	0.393	35.61	10.08	58.06	22.45	Pass	QP
4	0.168	24.57	10.24	55.46	30.89	Pass	AV
5	0.262	25.90	10.07	51.43	25.53	Pass	AV
6	0.393	25.79	10.08	48.06	22.27	Pass	AV

Neutral – PE(QusiPeak and Average detector used)



REDUCTION TABLE

No	Freq (MHz)	Level (dBuV)	Corr (dB)	Limit (dBuV)	Margin (dB)	State	Reference
1	0.177	40.98	10.21	64.96	23.98	Pass	QP
2	0.217	40.36	10.06	61.43	21.07	Pass	QP
3	0.258	38.08	10.07	58.28	20.20	Pass	QP
4	0.177	35.37	10.21	54.96	19.59	Pass	AV
5	0.217	32.09	10.06	51.43	19.34	Pass	AV
6	0.258	25.36	10.07	48.28	22.92	Pass	AV

Measurement data:

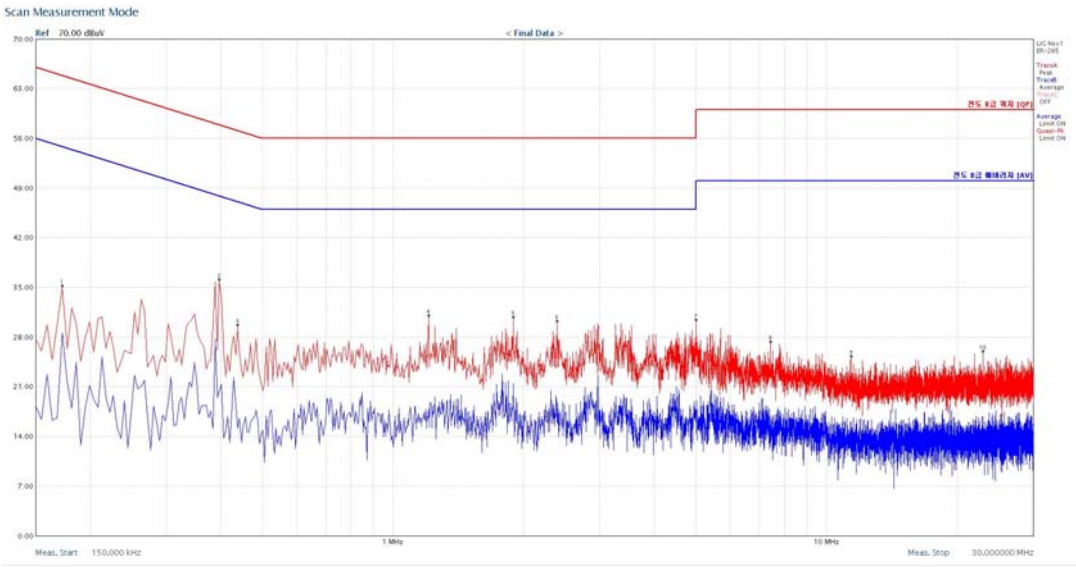
* Detector function was set into Quasi-peak & Average mode.

* Corr = LISN Factor + Cable loss + Pulse Limiter

5.12.2. Measurement Data (Operating Mode)

Pre-scan was performed with peak detected on all ports, Quasi-peak & average measurements were performed at the frequencies at which maximum peak emission level were detected. Please see the attached Quasi-peak and Average test results.

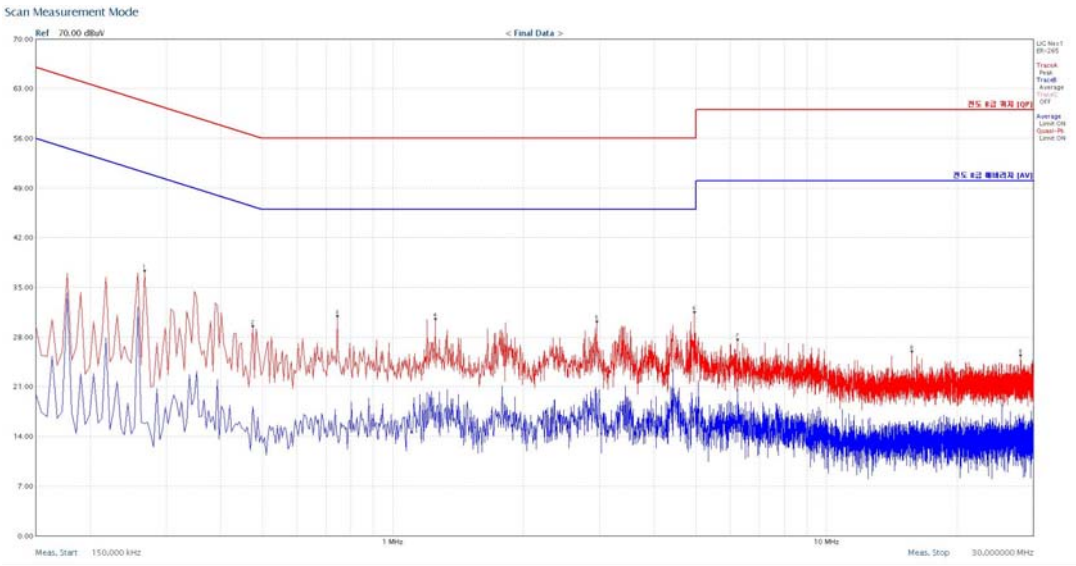
Line - PE(QusiPeak and Average detector used)



REDUCTION TABLE

No	Freq (MHz)	Level (dBuV)	Corr (dB)	Limit (dBuV)	Margin (dB)	State	Reference
1	0.172	34.90	10.21	64.96	30.06	Pass	QP
2	0.388	35.76	10.08	58.28	22.52	Pass	QP
3	0.172	28.61	10.21	54.96	26.35	Pass	AV
4	0.388	27.64	10.08	48.28	20.64	Pass	AV

Neutral – PE(QusiPeak and Average detector used)



REDUCTION TABLE

No	Freq (MHz)	Level (dBuV)	Corr (dB)	Limit (dBuV)	Margin (dB)	State	Reference
1	0.177	36.97	10.19	64.96	27.99	Pass	QP
2	0.217	36.40	10.05	63.21	26.81	Pass	QP
3	0.258	37.04	10.06	61.76	24.72	Pass	QP
4	0.177	34.24	10.19	54.96	20.72	Pass	AV
5	0.217	27.89	10.05	53.21	25.32	Pass	AV
6	0.258	32.25	10.06	51.76	19.51	Pass	AV

Measurement data:

* Detector function was set into Quasi-peak & Average mode.

* Corr = LISN Factor + Cable loss + Pulse Limiter

5.13. Radio Frequency Exposure Procedures

Regulation

According to §15.247(i) and § 1.1307(b)(1) , systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines.

KDB 447498 D01: Approximate SAR test exclusion power thresholds at selected frequencies and test separation distances are illustrated in the following table:

MHz	5	10	15	20	25	mm
150	39	77	116	155	194	SAR Test Exclusion Threshold (mW)
300	27	55	82	110	137	
450	22	45	67	89	112	
835	16	33	49	66	82	
900	16	32	47	63	79	
1500	12	24	37	49	61	
1900	11	22	33	44	54	
2450	10	19	29	38	48	
3600	8	16	24	32	40	
5200	7	13	20	26	33	
5400	6	13	19	26	32	
5800	6	12	19	25	31	

The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:

[(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)]

[√f(GHz)] ≤ 3.0 for 1-g SAR and ≤ 7.5 for 10-g extremity SAR, where

- f(GHz) is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation
- The result is rounded to one decimal place for comparison

The test exclusions are applicable only when the minimum test separation distance is ≤ 50 mm and for transmission frequencies between 100 MHz and 6 GHz. When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion.

Maximum Measured Transmitter Power :

Channel Frequency (MHz)	Maximum Peak Conducted Output Power		Max Antenna Gain (dBi)	Numeric antenna gain (mW)
	(dBm)	(mW)		
903	7.71	5.902	0	1.00

[(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)]

· [√f(GHz)] = 5.902/5*√9.03 = 1.121 ≤ 3.0

Threshold at which no SAR required is 16 mW and ≤ 3.0 for 1-g SAR, Separation distance is 5mm.

Conclusion : The SAR measurement is exempt.

APPENDIX

1. EUT photo